REGIONAL OFFICE FOR ASIA AND THE FAR EAST

TIGERPAPER

VOL IV NO 3 JULY 1977

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

UNITED NATIONS ENVIRONMENT PROGRAMME

TIGERPAPER is a quarterly news bulletin dedicated to the exchange of information relating to wildlife and national parks management for the Asia-Pacific region. TIGERPAPER is compiled, edited, and distributed by Jaap H. Kuper, Acting Regional Wildlife and National Parks Management Officer, under the FAO Regional Priority Programme for Asia and the Far East, with assistance for this issue by Janice Naewboonnien. Financial assistance is provided by UNEP.

TIGERPAPER
FAO Regional Office for Asia and the Far East
Maliwan Mansion, Phra Atit Road
Bangkok 2, Thailand

TIGERPAPER is distributed free of charge to people concerned with wildlife and nature conservation in the region. We are, however, dependent upon your free and voluntary contributions in the form of articles and news items in this field. Please write to us, therefore, and supply the information you have or request information you want. We appreciate receiving your letters and make all efforts to respond.

CONTENTS

Page

Ecology

Birds in Agriculture and Forestry 1
Impact of Domestic Stock on Chitral Gol . . 26

Conservation

An Opportunity in the Humid Tropics 4
An Island for the Kakapo 19
Elephants in Thailand 22
Wildlife Preservation in Bhutan 30

Management

Drafting a Management Plan 9
Game Ranching, an Antidote to Extinction . 17

Parks, etc.

St. Paul Subterranean National Park 29

Wildlife

Javan Tiger 8
Sumatran Rhinoceros 16
Pheasants 30
Javan Rhinoceros 33
Trade in Wildlife 33

Education

Education Program in Indonesia 32

Notes 32

Front cover: Asiatic lion at the Gir Forest, India.

The opinions expressed by the contributing authors are not necessarily those of FAO or UNEP. The designations employed and the presentation of the material in the TIGERPAPER do not imply the expression of any opinion on the part of FAO or UNEP concerning the legal or constitutional status of any country, territority or sea area, or the delimitation of frontiers.

THE ROLE OF BIRDS IN AGRICULTURE AND FORESTRY

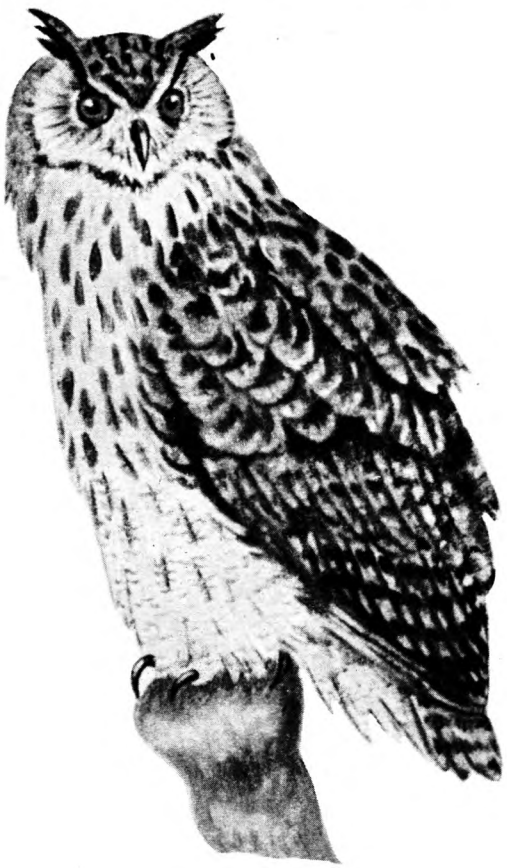
by Salim Ali

Well-meaning laymen, hurrying to ameliorate the lot of the poor struggling cultivator are puzzled, and even shocked, at the 'perversity' of the equally well-meaning ones who advocate the protection and conservation of wild animals and birds that often cause so much obvious damage to food crops, orchard fruit and forest resources and are thus palpably inimical to man's interests. If they had the power, they would rid the country completely of these destructive vermin once and for all. Since some birds attack standing crops in daylight, their criminal mischief is clear for all to see, and sufficiently self-condemnatory. Thus birds as a class are widely singled out for capital punishment.

Against this attitude there are others who firmly believe that but for the birds, the world would perish because without their unrelenting check on insect numbers, neither plant life nor the animal life dependent upon it, including man himself, could survive. How can these two conflicting views be reconciled? That there is much truth in the latter view is evident from the facts. The variety, fecundity and voracity of insects are colossal. Over 30,000 species have so far been described from the Indian subcontinent. Many of the insects are destructive pests of vegetation including our food crops, economic timbers and forest produce. The fecundity of insects is phenomenal. For example, one pair of the American colorado beetle *(Leptinotarsa decemliniata)* would, without check, increase to 60 million in a single season. As for voracity, many caterpillars eat twice their own weight in leaves per day; certain flesh-feeding larvae will consume 200 times their original weight in the course of 24 hours. Other examples of this kind are legion. The locust was well-known as a scourge to the ancients. Its swarms are sometimes so thick as to obscure the sun, and such a visitation can lay waste to vast areas of lush green fields in a matter of a few hours leaving not a speck of greenery for miles around. The female locust lays its eggs in capsules underground, each containing about 100 eggs. Several of these capsules are laid by each individual. On a farm in South Africa measuring about 1,800 hectares enough capsules were dug up to have produced 1,250 million locusts. It is obvious that with such astounding rates of reproduction and feeding potential it would not take long for all vegetation to disappear unless the hungry hordes were kept under constant and rigid control. This the birds do. White storks, Rosy starlings and some of the smaller hawks are among the most important enemies of the locust. A large proportion of the food of many birds is insects and their eggs. The insects are taken in all stages of their life cycle, above and below ground as well as in the air and in the water. An idea of the prodigious appetite of birds, and thus of the impact of the insectivorous species upon their prey can be gleaned from the fact that many birds in the first few days of their lives consume more than their own weight of food in 24 hours. The rate of metabolism in birds is higher than in mammals and the high energy demands for swift aerial locomotion render feeding a continuous process.

Owls and diurnal birds of prey, the hawks, are highly beneficial in keeping down the population of rats and mice and other such vermin which, as is sufficiently realized by all concerned with agriculture and forestry, are amongst the most injurious pests to be reckoned with. The overall loss in food grains attributed to rats is well over 10% of our total food production, and in certain areas and circumstances their depredations are truly staggering. The owls and hawks constitute one of the most impor-

tant and constant natural checks on rodent populations. Some years ago, an investigation was carried out by an Indian agricultural scientist on the Sind mole-rat *(Gunomys sindicus)* in the rice-growing Indus Delta area of Lower Sind. It revealed that between 10 and 50% of the entire rice crop was lost through the ravages of this rodent. Like insects, the fecundity of rats and mice is also astounding. It has been computed that a single pair of rats could increase at the end of the year to 880 rats. This figure is of course hypothetical and would never be attained in nature, but it is sufficient to point to their extreme reproduction potential and thus the capacity for mischief of this ubiquitous group of vermin. Mice are even more prolific. Many of our owls and hawks subsist predominently on a diet of these destructive rodents. It is normal to find the remains of 2 or 3 rats a piece in the stomachs of the larger owls such as the Great horned owl *(Bubo)* or Wood owls *(Strix)*. Digestion in birds is a rapid and continuous process so it is probable that more than two are destroyed in the course of a night's hunting. The smaller owls, and diurnal birds of prey such as the kestrel and shikra, also take a considerable toll of rats and mice in addition to various insect pests such as locusts and grasshoppers. Therefore, in spite of some petty larceny they may occasionally commit by filching a chicken from the poultry yard, they are deserving of every possible protection and encouragement.



Great horned owl

Now let us take a look at some other birds which are traditionally stigmatized as the farmer's foes. It is true that in some localities the damage done to cereal crops by birds is sometimes so heavy that the cultivator finds it uneconomical to harvest what they have left. But there are very few among them whose harmfulness to agriculture is so clear-cut and unequivocal as the green parakeets - in particular the Rose-ringed parakeet. The diet of this family from hatching through adulthood consists entirely of grain and fruit. Moreover, they have wasteful feeding habits and destroy far more than they actually consume. They take no insects and can otherwise claim no redeeming virtue from the economic point of view. They have few natural enemies to keep their numbers in check, and their legions multiply and wreck havoc with the cultivator's labours. The damage parakeets do to field crops and orchard fruit is colossal, and drastic control is undoubtedly called for. However, along with parakeets there are several other birds such as the weavers and members of the sparrow family which superfically appear equally culpable, but whose guilt is by no means so clear cut or unambiguous.

Under natural conditions, in areas untampered with by man, the sparrow tribe subsists mainly on grass and weed seeds. The birds live in moderate sized flocks and move about the country-side in quest of food. Their populations are then regulated and kept within reasonable bounds by the limited food supply and natural enemies. But with the increasing practice of monoculture of cereals, man has upset the balance of nature and unwittingly invited a concentration of pests, both insect and avian. Large scale monoculture, by creating an artificial super abundance of food, has fostered an inordinate increase in insect numbers. Freed from their natural checks, the birds have also increased and multiplied to pest proportions. Thus weaver birds and sparrows often band themselves into vast flocks of many thousand strong and undoubtedly do enormous damage to standing cereal crops, especially at the 'milk' stage. Their economic status, however, is a complex of debits and credits varying between beneficial and harmful, depending upon local conditions – season, diversity or otherwise of the available crops and so on. For it must be remembered that although the weaver birds and sparrows subsist largely on grain as adults, their nestlings in early life are fed almost entirely on caterpillars and soft bodied insects. Many of these are destructive agricultural pests and possibly taken from the very fields which suffer from the direct ravages of the birds. And in this way they largely compensate the farmer's loss by the beneficent services they render.

Adequate, wisely maintained forests apart from direct economic benefit constitute natures strongest insurance against floods and drought such as we are experiencing today. Problems of forest ornithology are somewhat different from those

pertaining to agriculture. Here also the responsibility of birds for maintaining healthy stands of trees has been amply recognized in the more developed countries, and that the minor damage they may sometimes do is only local and transitory. The beneficial impact of birds on forests has become clearer since the practice of monoculture, i.e. the commercial management of a forest to produce a single species of tree, has become more general. Fewer birds in monocultured forests, owing to absence of tree holes and shrubbery for nesting and feeding, means greater risks from plant diseases. A well-formed tree, such as managed plantations aim to produce, is an unfriendly thing for a bird to nest in. Therefore, in order to attract birds to such forests it is an accepted practice in modern forestry, when clear-felling to replant with, say conifers, to diversify the habitat by retaining a few overmature stems, and 'islands' of broad-leaved coppices as temporary shelters for the new crop as well as feeding and nesting sites for enriching the bird life. The practice deserves to be adopted in India in cases of monoculture of exotic species like Eucalyptus which is uncongenial for a rich and diversified avifauna. German and Soviet foresters provide nest boxes for hole-nesters in managed conifer forests, and shelves or 'nest pockets' of twigs tied to the stems for birds that build open nests at low and medium heights. Different species of birds are adapted for feeding in different niches on a wide variety of forest insects such as wood-boring beetles, defoliating and leaf-rolling caterpillars, wood-destroying termites, sap-sucking aphids, and other. Insects infest every part of a tree - root, stem, bark, branches, twigs, leaves, flowers, fruits and seeds. Therefore a diverse community of birds needs to be fostered so that every part of the tree receives proper monitoring from the appropriate predators. In India, very little study has been done on birds in relation to forest insects which are the worst enemies of sylviculture; for instance the two lepidopterous larvae which cause heavy defoliation in teak. It is not known whether their control by birds differs in natural teak forest from that in pure teak stands in plantations. A comparative study of the role of birds in natural versus man-made forests would prove well worth while.

In our efforts and plans to grow more food the importance of bird study from the economic point of view has not received the recognition that is its due. The damage resulting from drastic measures to control bird populations that are seemingly harmful without a proper scientific investigation of their ecology and overall economic status, has been demonstrated again and again in several countries. One example is the all-out campaign for the extermination of sparrows in China a few years ago. Sparrows, as mentioned earlier, *can* be highly destructive to cereal crops, but at the same time they destroy untold quantities of insect pests. It was soon discovered that total extermination is not the

Rose-ringed parakeet

answer. The excessive zeal to destroy the sparrow boomeranged in the shape of redoubled onslaughts by the insect hordes released from the effective control of the birds. The 'total war' against the sparrow was abandoned. There is a moral adorning this tale which our agricultural planners and legislators will do well to heed.

For a scientific and meaningful assessment of the double-sided impact of birds on human affairs - our allies in certain situations and our foes in others - a proper study of their complete life histories is essential. We must have precise knowledge of their ecology - their food and feeding habits, their biomass and their population dynamics. Without detailed information of such birds as are popularly impugned as pests it is unwise to consider any drastic action to eradicate them. In a country like India, so largely dependent upon agriculture and forestry, research on the economic status of birds obviously deserves high priority. It is to be hoped that the study of economic ornithology will be given due importance and encouragement in our agricultural universities and by the Indian Council of Agricultural Research in the ensuing 5-year Plan.

To close this plea on behalf of birds, for their protection and encouragement, I can do no better than quote the introductory remarks of the Chairman, Sir A. Landsborough Thomson, in *Proceedings of a Symposium on the Problems of Birds as Pests* recently held in London. He says 'Birds are to a great extent economically beneficial; they are also, of course, scientifically interesting and aesthetically delightful. Yet some species tend to be harmful, and others become pests when present in excessive numbers or in the wrong places. The task is, dispassionately and objectively, to determine the facts and consider what to do.'

PAPUA NEW GUINEA: AN EXAMPLE OF CONSERVATION OPPORTUNITY IN THE HUMID TROPICS

by H.A. Haantjens

Papua New Guinea has a wide range of tropical ecosystems, and there are enough undisturbed areas to preserve them all. Traditional man's integration with his environment and with his land implies a need for specialised conservation education, and national parks established on tribal land and managed in co-operation with land owners, rather than parks run by a government agency alone on alienated land. The great scientific and educational value of Papua New Guinea for the world at large, together with the present inability of the country to devote large resources to conservation, justify and demand international financial and technical assistance in conservation projects.

In contrast to most affluent Western countries and the densely populated Asian countries, Papua New Guinea gives the impression of having, up to now, largely escaped man's destructive impact on the natural environment. Since it also harbours a rich variety of tropical ecosystems from dry monsoon savanna to continuously wet rain forest, from lowland freshwater swamp to alpine mountain, from coral reef, beach ridge, and mangrove flat to active volcanic peak, it can easily be understood how observers see here a chance to practice conservation in a manner which must forever be denied to them in the developed world with its long history of destruction (Schultze-Westrum, 1971).

While not denying the considerable potential for conservation in Papua New Guinea, this paper argues that a successful conservation policy for this country does not simply require learning from and avoiding the mistakes made in other parts of the world, but must be developed from a clear understanding of the local natural, social, and economic factors that are affecting attitudes to and prospects for conservation.

The need for action in the near future emerges from the brief section on Papua New Guinea in the report of the Australian Subcommittee for Section CT of the International Biological Program (Specht et al., 1974, p. 591) which emphasizes the lack of factual information and the difficulties of financing research and park establishment, and which lists only two established national parks.

Ecological status and impact of New Guinea culture

The essential feature of the indigenous way of rural life is that it is *part of* the ecosystem, not a replacement of it as in the West and parts of Asia. This direct involvement is most obvious with the swamp dwellers, who exploit sago and game in the forest, aquatic animals and plants in the waterways. But is is still clearly present in the shifting agriculture system, relying as it does on an ecological balance sustained by natural regenerating forces in the ecosystem. As long as man functions as an integral participant in ecosystem processes he is unlikely to have any conscious concern for conservation, but will simply act as one competitive element amongst all the others. Concern can only develop when his primary field of economic and social activity has become divorced from the natural environment. A second consequence of the integration of man and environment in Papua New Guinea is that land is part of man's life system, not just a form of wealth as in the West. Separation from his land cuts at the roots of his existence.

Thus two basic considerations must be borne in mind when planning conservation in Papua New Guinea:

1. The Western concept of conservation is alien and irrelevant to hunters, gatherers, and subsistence cultivators.
2. The transfer of legal titles to land will not undo the original owners' associations with that land.

Impact

Let there be no illusion about the severity of traditional man's impact on the natural environment. In contrast to apprehensions about the transition from traditional land use to modern commercial exploitation of natural resources it can be expected that permanent land use based on modern technology and sound ecological principles will be the more conducive to achieving the long-term objectives of conservation.

Shifting cultivation. With a rotation period of between 5 and 20 years or more, the areas of forest destroyed are many times the areas used in any one year for crop production. On the one hand the area of natural forest destroyed usually remains limited because of re-utilisation of land, under secondary vegetation. On the other hand, such repeated clearing, through short rotations and with the use of fire, can lead to the introduction and extension of grassland. This not only represents a stronger degradation of the ecosystem, but can in turn lead to migration of clans or tribes to new areas of virgin forest, where the process is repeated. From a vegetation map by Paijmans (1975) it is estimated that up to 40% of the forest area bears the imprint of interference by man. The population responsible

for this, in a country of 470,000 sq. km, has grown to 2.5 million from less than 1.5 million in 1950, but can be assumed to have been rather stable at this lower level before World War II. Man's capacity to fell forest has been increased by the introduction of modern tools, but there is little evidence that this had led to more land clearing than is required for the immediate needs of a growing population.

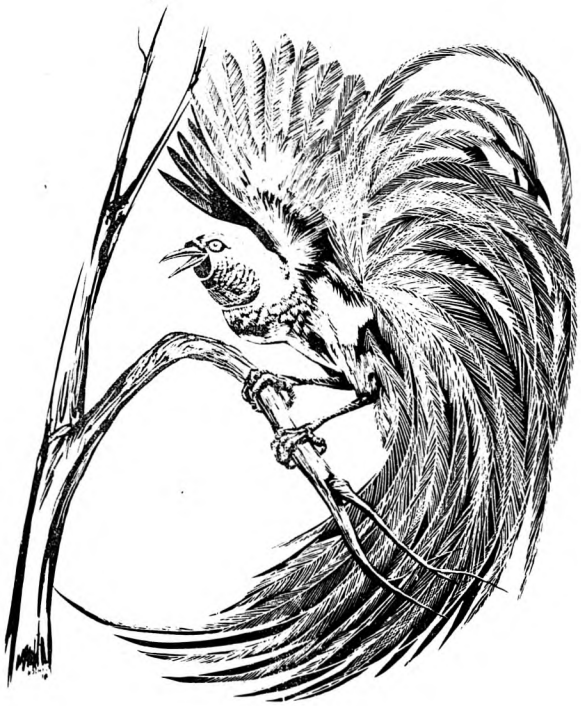
Burning and hunting. As mentioned, fire is the mechanism by which degraded secondary woody vegetation is eventually converted into grassland, and by which such grassland is maintained. More directly, burning has led to a considerable increase of high mountain grassland at the expense of montane forest (Paijmans and Loffler, 1972). It appears to be responsible for the development of most savanna vegetation from dry evergreen and deciduous forest and woodland. In places natural plant successions on floodplains and volcanoes have been arrested at the grassland stage by fire. Without man's intervention, grassland and savanna would probably be rare vegetation types in Papua New Guinea instead of covering some 15% of the land as at present. The rate of grassland formation depends on climatic and edaphic factors. While one might expect the area of grassland to have increased with the rapid population growth over the last 30 years or so, this has apparently not happened because the most vulnerable forest types had already been largely converted through thousands of years and have become rare.

Although representing a loss from the forest conservation point of view, man-induced grasslands and savannas have become stabilised ecosystems in their own right which contribute to the ecological and scenic diversification in the country, and may in turn require protection from destruction.

As a hunter, man most clearly plays his role as just one other species in the ecosystem. With increasing numbers and particularly with increasing power (shotguns!) he may upset the ecological balance and must be controlled. This is indeed one of the acute conservation problems in Papua New Guinea.

Population pressure. Papua New Guinea's favourable position for nature conservation is not due to innate or acquired conservation mindedness of traditional culture, but to a low population density. In addition, the relative inefficiency of the available destructive technology has made only minor impact against climatic and edaphic conditions that generally engender a strong resilience to disturbance in the vegetation.

An exponential rise in population numbers combined with improving technology make it imperative that shifting cultivation be phased out and agricultural production be concentrated on smaller but permanently and intensively cultivated or grazed areas. Hunting should be regulated rather than given free rein as a foraging and commercial pursuit, and forestry, fisheries, and mining ventures should be carefully balanced against conservation requirements.



Red plumed bird of paradise

Economic considerations

In affluent societies conservation is primarily seen as a cost. It involves justifying expenditure or foregoing of income to satisfy a want, not to produce increased wealth. Since conservation ranks low amongst human wants, its need is most strongly felt by those strata of society whose more basic requirements are already amply satisfied. With some notable exceptions, the least support comes from the poor and from secondary and primary industry workers who have more pressing problems to worry about and who may conceive of conservation as some sort of threat to their livelihood.

In so far as nature conservation requires financial sacrifice, it is therefore not likely to receive much support in a country like Papua New Guinea, which is busily trying to catch up on much more fundamental needs such as housing, consumer goods, education, health, and transport. This attitude will be reinforced by the apparent lack of urgency of conservation and pollution issues as compared with the situation in affluent countries.

In correctly noting the great opportunities for conservation in Papua New Guinea, the West would do well not to view this primarily as a national responsibility of that country, but to realise that at this stage it is an affluent world at large which wants to grasp this opportunity and which cannot countenance the destruction of yet another hoard of natural treasures. The obvious consequences of such

an attitude would be to bear a large part of the cost of achieving the desired objectives.

Virtually the only way in which nature conservation can earn rather than cost money is by its promotion of tourism. But this produces wealth for the nation only if visitors are attracted from abroad (although it may have its uses internally in providing extra earning capacity in parts of the nation lacking other resources).

Competitive land use

Economic impediments to conservation are most serious when the establishment of reserves not only involves financial outlay *per se*, but also prevents the development of natural reources for economic gain. It is because of this that national parks tend to be relegated to areas lacking any economic potential. However, it is most important, particularly from the scientific-educational point of view, to set aside sufficiently large tracts of ecosystems that are likely to be interfered with or destroyed in their entirety by economic development.

King bird of paradise.

Mining. Conflict between conservation and mining in developed countries is much greater than would be expected from the small areas involved, because mineral deposits are not infrequently discovered (sometimes after the proclamation of parks) in scenic or unusually interesting areas initially thought to be free of such economic pressures. In Papua New Guinea, where there is still so much room for manoeuvering in the geographic location of parks, it would be good policy to subject proposed parks to mineral exploration before they are declared. (This includes an appraisal of the areas as potential sources of construction materials.)

Where mining or quarrying potential is demonstrated, it will be difficult, and often unwise, for conservationists to oppose its development, because of the increasing demand for, and dwindling supplies of these resources. In many cases a suitable alternative site for conservation would be available and should be used. Frequently too, it should be possible to reconcile mining and conservation interests by advance planning. Ecosystem disturbance may be minimised, pollution kept at acceptable levels, and particular sites protected absolutely. The mining operation can be beneficial in improving access, providing power and services, and by adding a focal point of interest. Worked-out areas may be treated and transformed for recreational purposes.

Although severe environmental damage in the immediate vicinity of a mine may be unavoidable, damage to the overall environment by mining and quarrying can be kept small because only small areas of land are directly involved. This assumes proper control of pollution from tailings and spoil, and limited open-cut operations.

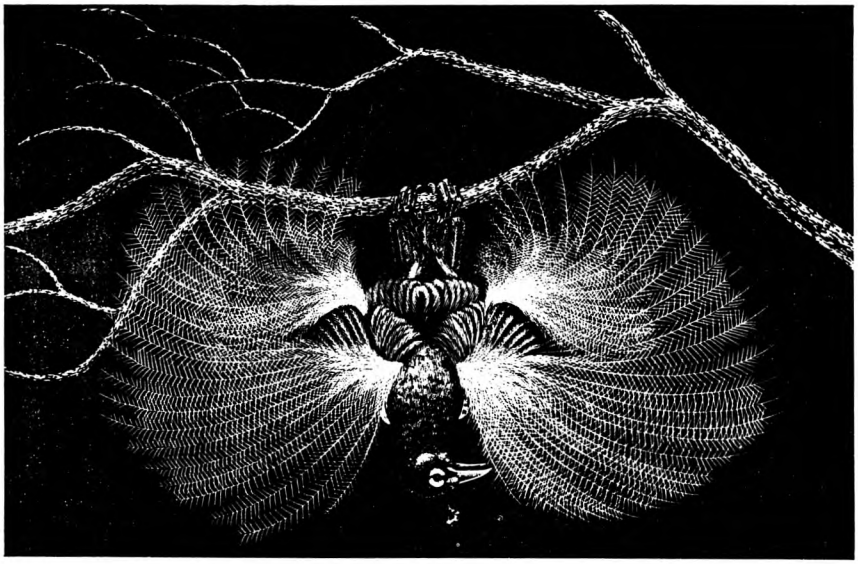
Forestry. Forests are commonly considered renewable resources, and in practice there are great difficulties in managing them. In Papua New Guinea, forest exploitation generally consists simply in the removal of all merchantable timber, leaving behind an impoverished forest, or no forest at all in the case of the proposed clear-felling for woodchips. Regeneration to a new stable climax forest may take centuries - if it takes place at all. Only a few territorial forests and timber reserves are earmarked for sustained timber production including forest plantations, but forests are not set aside for conservation.

Logging permits sometimes extend over large tracts of land because it is only necessary to purchase the timber rights from indigenous owners, without having to buy the land itself. In view of increasing demands for forest products, particularly in Japan, the forest industry may expand rapidly. Since forest ecosystems are of prime concern to conservation there is clearly a potential for conflict, particularly since at present conservation responsibilities and activities are not mentioned as part of Papua New Guinea forest policy of 1973 (PNG Department of Forests, 1973).

Agriculture. Clearing of land for crop production is even less compatible with nature conservation than exploitation for timber. The real impact is not so great, however, because there is much less land suitable for agriculture than there is for forestry. In addition, much agricultural development can take place on land already under secondary vegetation, or following timber extraction from forest land.

On the other hand, there are many non-forested areas with conservation potential. Conflicts could arise in particular where natural wetlands are to be reclaimed for agriculture. Retaining parts of such areas as nature reserves can involve technological problems because of the disparity in water regime between the reclaimed and the preserved natural land.

If conservation is conceived to include cultural features as well as natural ones, a more serious conflict situation comes to light. Although Papua



Bleu bird of paradise

New Guinea is a very scenic country, there are, in fact, few (if any) features sufficiently outstanding to attract large numbers of overseas visitors. Neither are climatic conditions ideal for tourism. Wildlife, although most unusual in kind, is generally difficult to observe, in contrast, for instance, to that in the east African national parks. The real spice in the tourist industry that will lure travellers to Papua New Guinea are manifestations of traditional culture which in their own tropical setting are truly exciting and unique.

Being much more endangered by economic and social development than are the native flora and fauna, this traditional culture will increasingly become the center of serious conservation conflict, with difficult human problems to be solved.

Approach to conservation

Papua New Guinea differs from densely populated countries mainly in that there are still areas of intact natural ecosystems (and commonly large ones) with a high potential for economic production, which can be expected to come under rapidly increasing pressure for logging and/or conversion into pasture, cropland, plantation, towns, and roads as economic development gathers pace. Priority should therefore be given to setting aside enough acreage of such ecosystems to satisfy the scientific and educational needs of posterity, even though this may involve foregoing some economic gain in the present and even though the landscapes concerned may not be aesthetically attractive. Although areas proposed as national parks by the National Parks Board are mostly on poor quality land or in inaccessible or remote parts of the country, there is now a growing awareness of the need for a broader outlook and for parks to be accessible.

The many options still open in site selection for parks allow a staged approach to this problem. The first step should be the approximate delination of large regional conservation zones, known to include representative areas of significant ecosystems and/or unique terrain, water vegetation, or cultural features worthy of special management or prevention. Normally large or small parts of a conservation zone will have no special conservation interest and/or will possess a distinct potential for economic development. Selection of such conservation zones would make use of general geology, land form, vegetation, soil, climate, and population maps, as well as exploiting the familiarity with special aspects and features of the terrain, flora, and fauna that some individuals have gained through field work and air-photo interpretation. A first attempt at delineation of broad conservation zones has been made by Schodde (1973), while a new set of more detailed proposals was presented by the author in a paper to the May 1975 Waigari Seminar in Port Moresby.

The second stage should consist of a more detailed inventory of each conservation zone, priority being given to areas under the greatest immediate pressure. The inventory would concern itself with fauna and flora, land forms, vegetation communities and status, special geological and soil features, potential for mining, quarrying, forestry, agriculture, fisheries, water power and storage, recreation, transport and urban settlement, and importantly, with indigenous land tenure conditions.

On the basis of such inventories potential national parks and different kinds of reserves can be outlined in detail in stage three, and both their positive and negative aspects documented. In addition spatial and functional relationships between selected parks and reserves and other areas within the conservation zones can be described.

The final stage concerns the actual declaration or rejection of the proposed parks and reserves and the preparation of regional development plans for the conservation zone as a whole.

The system should be used in a flexible manner: it is not essential that every conservation zone should finally yield a national park, nor that every reserve is part of a conservation zone. And regional planning should not be restricted to conservation zones. However, the network of conservation zones must give representative coverage of all important ecosystems in Papua New Guinea, include the major unique natural and cultural features that could suffer from unlimited economic utilisation and provide examples of regional planning that may be used in setting planning standards elsewhere.

from **Search** *6: 11-12*

Selected References

Day, M.F. 1971. **The role of national parks and reserves in conservation.** p. 190 in Conservation (Ed. A.B. Costin and H.J. Frith). Penguin Books Aust. Ltd., Ringwood, Vic.

Diamond, J.M. 1973. **Distributional ecology of New Guinea birds.** Science 179:759.

Frith, H.J. 1974. **Wildlife Conservation,** p. 414, Angus and Robertson, Sydney.

Haantjens, H.A. 1965. **Practical aspects of land system surveys in New Guinea.** J. Trop. Georgr. 21:12.

Kikkawa, J. and Williams, W.T. 1971a. **Altitudinal distribution of land birds in New Guinea.** Search 2:64.

Kikkawa, J. and Williams, W.T. 1971b. **Ecological grouping of species for conservation of land birds in New Guinea.** Search 2:66.

Paijmans, K. 1970. **An analysis of four tropical rain forest sites in New Guinea.** J. Ecol. 58:77.

Paijmans, K. 1975. **Vegetation map of Papua New Guinea with explanatory notes.** CSIRO Aust. Land Res. Ser. No. 35.

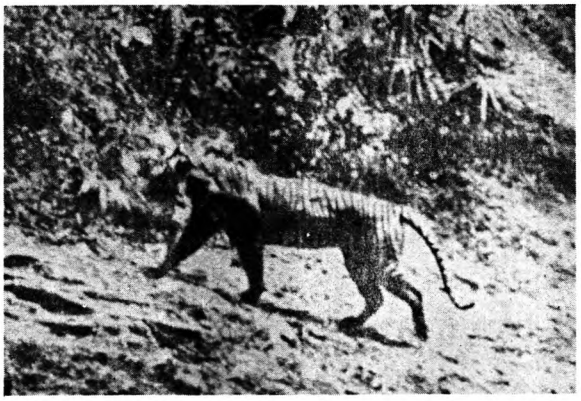
Paijmans, K. and Loffler, E. 1972. **High altitude forests and grasslands of Mt Albert Edward, New Guinea.** J. Trop. Geogr. 34:58.

PNG Departments of Forests 1973. **New Horizons: Forestry in Papua New Guinea.** Jacaranda Press, Brisbane.

Schodde, R. 1973. **General problems of fauna conservation in relation to the conservation of vegetation in New Guinea.** p. 123 in Nature Conservation in the Pacific. (Ed. A.B. Costin and T.H. Groves). ANU Press, Canberra.

Schultze-Westrum, T.G. 1971. **Conservation in Papua and New Guinea: Final report on the 1970 World Wildlife Fund Mission** (mimeo). IUCN, Morges, Switzerland.

Specht, R.L., Roe, E.M. and Boughton, V.H. (Eds) 1974. **Conservation of Major Plant Communities in Australia and Papua New Guinea.** Aust. J. Botany, Supplementary Series, Suppl. No. 7.



Javan tiger (Hoogerwerf)

JAVAN TIGER ON BRINK OF EXTINCTION

The Javan tiger is in imminent danger of extinction and only four or five survive according to the report of a survey by the World Wildlife Fund carried out in association with the Indonesian Government.

The Tigers *(Panthera tigris sondaica)* are in the nature reserve of Meru Betiri on the mountainous southern side of the eastern tip of Java. But according to Dr. John Seidensticker, the investigator, they are in an area relatively poor in deer and pig, which are their main prey, and they have to compete with Leopard and Wild dog.

The Javan tiger is smallish compared with those of mainland Asia, generally darker and with closer and narrower stripes. By the second world war it had already been seriously reduced in numbers by ruthless hunting for trophies and bounty. Hunting continued after the war while destruction of forests reduced suitable habitat. Despite occasional reports there is no firm indication that tigers are to be found anywhere other than Meru Betiri now.

Further more there are no reports of Javan tigers in zoos, which might be brought together for captive breeding.

Dr. Seidensticker has produced a management plan for the Meru Betiri Reserve to improve the prospects of the survivors, and adds that there must be strict protection from further killing.

The nearby Bali tiger *(Panthera tigris balica)* is now considered extinct, and recent surveys in Iran and eastern Turkey found no positive signs of the Caspian tiger *(Panthera tigris virgata)*, although some individuals might survive in the mountains of northern Iraq.

WORLD WILDLIFE FUND *Press Release 12/1977*

DRAFTING A MANAGEMENT PLAN

With the help of a management plan we intend to program the management of a certain area. Often this is a national park, wildlife reserve or sanctuary.

In this case we will confine ourselves to parks and reserves and will, for convenience, refer to parks in the text only.

Preparation of a management plan requires the answers to three basic questions:

1. Why do we want to do something?
2. How do we have to do it?
3. Who is going to do it?

Those three questions are interrelated; if we ignore one of them the other two cannot be answered or acted upon adequately.

Let us have a closer look at the three questions. Question 1: *Why do we want to do something?* There have been good reasons to give the area we are considering a special status, and therefore this park has been established. We will refer to this as: *Reasons for establishment.* The reasons for establishment are almost always based on the limited data which were available at the time of establishment. By the time the establishment has been achieved more detailed objectives will have to be worked out. We will refer to those as: *Objectives.* The limited data which were so far available will not be sufficient to clearly outline what we want to do with the park or what we want to use it for. So we will have to collect all the relevant information that can enable us to design the objectives or park policy. This information will be referred to as: *Basic information* and can be divided into three groups: (a) General information, (b) Natural resources and (c) Cultural resources. By now we know what we want (Objectives) and we know what we are talking about (Basic information), so let us consider the second questions: *How do we have to do it.*

In the management plan the answers to this question must be given. These answers will be referred to as: *Management programs.* The goal will be to make use of the resources of the park in such a way that the program will serve the objectives. The number of programs will depend on those objectives and it should be noted that the separate programs must not be contradictory. For instance the program for recreation should not be designed in such a way that it will be detrimental to resource protection. This means that an order of priority within the objectives will result in an order of priority for the management programs. In general the order of objective-priority will be (a) conservation, (b) research, (c) education, (d) recreation, (e) the estate.

Once we know how we are going to do it (Management programs) we will consider Question 3: *Who is going to do it?* Before we embark on this, we will have to realize that it almost never happens that enough personnel and funds are available to do everything at once. Therefore, we have to decide what has to be done first, second etc. We will state the work-priorities. In the following we will refer to this as: *Priorities.* After this we will have to outline the structure of the organization involved in implementing the management programs, and state who is responsible for each part of the program and who is responsible for the program as a whole. To this we will refer as: *Responsibilities.*

The preliminary table of contents thus becomes:

- Reasons for establishment
- Basic information (General information, Natural resources, Cultural resources)
- Objectives
- Management programs
- Priorities
- Responsibilities

The definite management plan has to be a clear and practical report. Therefore, besides small maps, only written information will be included in the text, and all tables, large size maps, etc. should be added as appendices.

The detailed table of contents will finally become as follows:

1. Title
2. Reasons for establishment
3. Basic information
   a. General information
      - Location and boundaries
      - Brief description
      - Regional analysis
      - Access and communications
      - History of establishment
      - By-laws
      - Permits
      - Reference collections, maps, photographs
   b. Natural resources
      - Geology
      - Climate
      - Soils
      - Hydrology
      - Flora
      - Fauna
      - Specific genetic and ecological features
   c. Cultural resources
      - Archaeology
      - History
      - Recent land use
      - Contemporary culture
4. Objectives
5. Management programs
   a. Management for conservation
   b. Management for research
   c. Management for education
   d. Management for recreation
   e. Management of the estate
6. Priorities
7. Responsibilities

Appendices

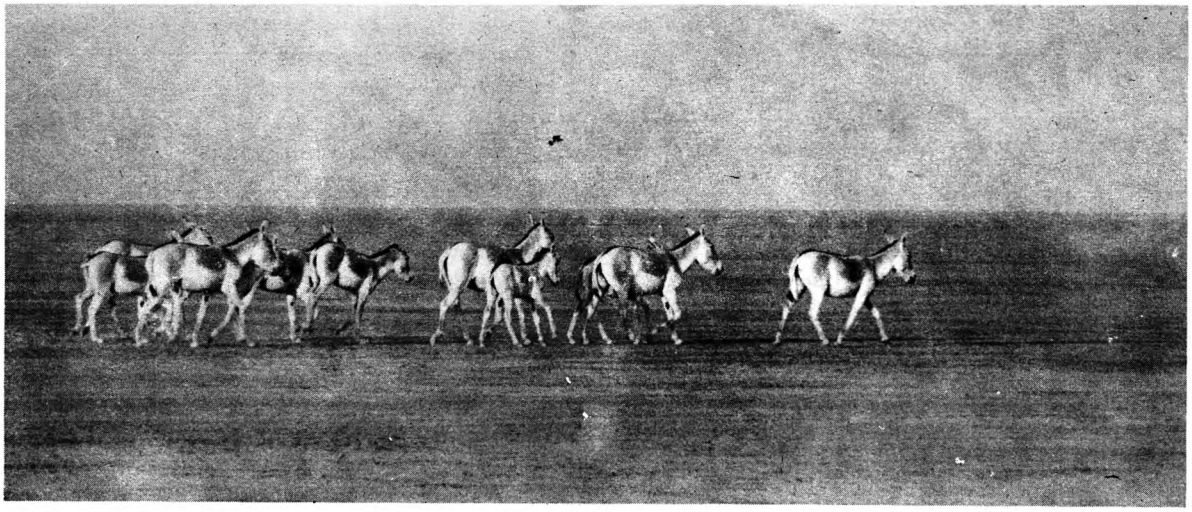
In the following some comments will be given on several of the items which appear in the table of contents. The comments are partly based on the reports: National Parks Planning by John Moseley, Kyran Thelen and Kenton Miller, 1976, FAO, Rome; and: Royal Chitwan National Park Management Plan 1975-1979 by Melvin Bolton, 1975, FAO, Rome.

1. Title.

2. Reasons for establishment.
This paragraph will describe why the area was set aside.

3. Basic information.
3a. General information.

- Location and boundaries. This section will geographically locate the park. A short description will be accompanied by a location map showing the parks' relationship to important cities, tourism objectives, and transportation systems. A detailed description of the boundaries will be included in the appendices.
- Brief description. A short description of the park is given, comprising of size, shape, main habitat types, physiographical and biological features, water and forage availability.
- Regional analysis. To prepare a plan that is integrated with other social, economic, and political influences that presently or in the future will affect the park, it is essential that a study be conducted of the region in which the park is located. Although regions have no absolute size or configuration, they are usually composed of surrounding or adjacent areas that are reasonably cohesive, economically, geographically and politically.
- Access and communications. Examine access to and the transportation system within the region. Identify and note the condition of principal access



roads. Learn of proposals for new routes or improvements for existing roads. Likewise there should be an examination of existing and planned facilities for air, rail and water transportation. Show, if possible, statistics or projections of the number or percentage of people who use or will use public transportation to reach the region. Analyze how visitors will reach the park, during the different seasons of the year. State the available radio links, their operating schedule and wavelength.

- History of establishment. Give a description of the establishment of the park, with dates of declaration, additions etc.
- By-laws. If there are any by-laws concerning the park they can be described here. In case they are very comprehensive, they can just be mentioned here and be added to the appendices as will be the case with park rules.
- Permits. State the sort of permits that are issued and their conditions.
- Reference collections, maps, photographs. The available reference collections will be mentioned, like herbaria, animal collections, maps, arial photographs.

3b. Natural resources.

- Geology. This section will be broken down into broad geological headings, i.e. stratigraphic, paleogeographic, structural and morphological features. Geomorphological processes such as volcanism, glaciation and other mass movements will be documented. Moreover, man-caused modifications or changes in the geologic resources also will be noted. Descriptions will be written to proceed from the general to the specific.
- Climate. A systematized presentation of data on temperature, precipitation and other climatic phenomena will be placed in this section. Follow this with a narrative description of the role of weather as a controlling or influencing factor on use, management and development. If climatic conditions vary substantially from place to place within the park, this should be reflected in both the charts and narrative. If detailed information is not available, use conservative generalizations.

Temperature: On a chart show average maximum and average minimum air temperatures by months. If available give average day-night temperature differences, extreme lows and highs. Indicate length of the construction season as determined by temperature. Note any special effects of temperature on use, management or development of the park. For water oriented areas include data on water temperature.

Precipitation: Give average rainfall and snowfall by

month on a chart. When available give snow depths and duration of normal snowpack. Describe drift characteristics. Note any special effects of precipitation on the use, management and development of the park.

Wind: Give prevailing wind direction and velocity by seasons. Indicate maximum velocities (storm winds), their direction and dates of occurrence. Note any effects of wind on visitor use, management or development in the narrative.

Isolation: Show graphically the incidence of sunshine, the number of sunny days throughout the year. This information is particularly important for areas being planned for visitors seeking sea and sun.

- Soils. An abstract of a soil survey can be given. If no survey has been carried out, then a general description of the soils should be given, comprising of the occurrence and extention of alluvial soils, vulnerable soils, erosion etc.
- Hydrology. Drainage of the precipitation, occurrence of annual and perennial rivers, lakes and waterholes should be indicated. Annual or incidental floods, the area they cover, including the timespan, will be outlined. Historical data on the occurrence of water in annual rivers and streams can, if reliable, be indicative for changes in hydrology. Incidence of annual and incidental shortages of water will be discussed.
- Flora. Describe the vegetation zones found in the park and list the representative species and plant assemblages for each zone. Give the size of these zones, and their location.

Following this broad classification of vegetation types smaller and more specific elements will be documented such as important and endemic species, introduced species, or specimens of outstanding

size or age. Note significant changes brought about through natural or man-caused activities. Note rare and endangered species as well as recently eliminated species. A checklist of plant species will be added as appendix.

- Fauna. Important species will be listed and associated with habitats. Broad classes will be documented (mammals, birds, reptiles, fish, etc.). Also noted will be seasonal phenomena such as migration, nesting, or spawning. Note rare and endangered species as well as recently eliminated species. Note feral animals occurring within the study area, along with an estimate of their number. Fish will be listed by principal species, whether native or introduced and by major environment (ocean, bay, freshwater). Note waters in which only native species occur or where there are no fishes from either natural or artificial causes. Checklists of species will be added as appendices.
- Specific genetic and ecological features. Describe special ecological assemblages which have particular interest or value and warrant special treatment for the conservation of genetic materials. Indicate samples of ecological units or sites for environmental monitoring. Examples include plant and animal species with possible potential for breeding in agriculture and medicinal purposes, unique ecological transition zones, or major geological phenomena which are found in a natural, pollution-free state within the park.

3c. Cultural resources.

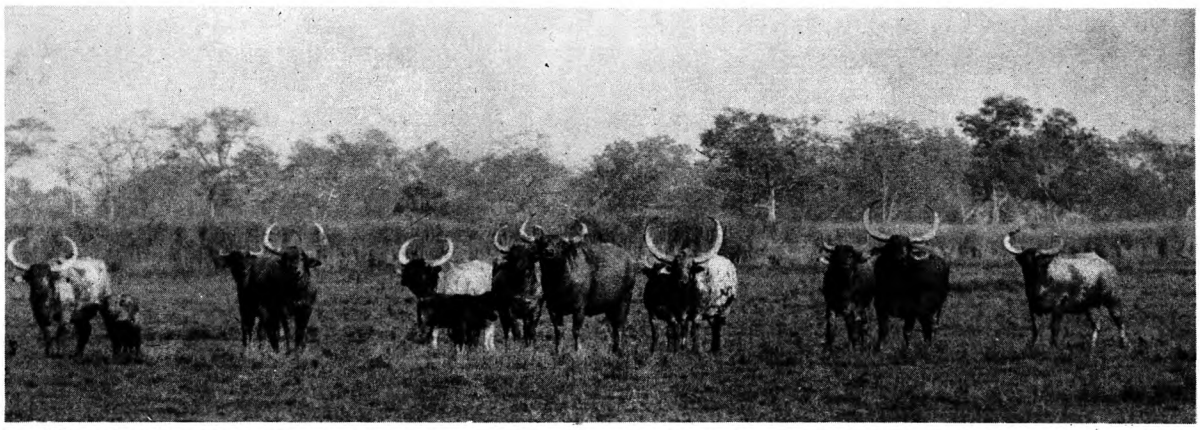
- Archaeology. Appraisals or studies of archaeological sites require the services of a competent professional archaeologist. His services should be engaged to document the following: a description of the culture and the approximate span of time that it existed at a particular location; a determination of whether archaeological investigations have been made, if so by whom and what was discovered, the extent of the excavation, and whether portions of the site have not been investigated; and a description, to the extent possible, of what the site or structures originally looked like with a notation of the condition of any physical remains still in existence. This information will be shown graphically on a cultural history or archaeological base map. Evaluate the resource, relating the site to the total culture of which it is a part. State clearly any particular significance the site possesses. Demonstrate important facets of the culture with notations of any other factors affecting the value of the resource.

- History. If the park contains historically important resources (grounds, terrain, structures or objects) the principal details or events associated with these resources will be described. Important closely related antecedent and subsequent events, whether they took place in the park or not, should be noted. Develop a clear picture of what the area probably looked like during the historic period. Describe the historic physical remains and general scene that exists today and compare the two to demonstrate the changes that have occurred. If significant, an historical base map will be prepared to facilitate future management and development decisions.
- Recent land use. The way the land was used up until the moment the area was declared a park has often had a strong ecological impact. The impact can have been as varied as from increase to decrease in habitat diversity. Particularly the use of fire has often had significant influence on the habitat. It should be noted here that the decision to do "nothing" in a park is just as much a management policy as anything else. One should realize that in some cases this means a sudden change in management and can have undesirable effects, and should therefore be thoroughly considered.
- Contemporary culture. National park boundaries are usually drawn to exclude areas of human habitation. However, when park goals cannot be otherwise achieved or when the presence of an anachronistic culture is judged to be necessary to the retention of park values, consideration will be given to their inclusion. Although the touristic value of indigenous cultures, isolated from the main stream of modern development is well recognized, the problems stemming from their management as tourism attractions can be manifold without the establishment of proper controls. These controls must respect the social and religious customs of the indigenous people and should be directed only at the preservation of values that appear in the landscape. In the case of lands

occupied by non-indigenous cultures it is imperative that these lands be acquired and that their occupants be relocated. Often such relocations can be implemented through existing agrarian reform programmes, through land exchanges; or through conditions of deferred tenancy.

4. Objectives.

Based on the information given in the previous section, the park policy can be outlined. The policy should be detailed, and should state clearly what the objectives of the park management comprise. The objectives will serve as the backbone of the park manager's approach of the management programs. A policy stated in general terms only, will create confusion, since different people will then have different interpretations.



5. Management programs.

5a. Management for conservation.

- Zoning. Once boundaries have been set, a system of evaluating and classifying park land and water areas becomes necessary. This basic step of separating the entire park into *management zones* is taken to provide proper recognition and protection for park resources. As a tool for resource management it will indicate where physical development can be placed and equally important, where it will not be placed. A careful evaluation of appropriate zones will provide a basis for making many other judgements. Describe specific park lands (qualities and quantities) and formulate objectives for the zones selected. Document the norms for each zone. The following zones could be recognized:

Primitive-Scientific Zone: These lands represent the most important and often the most fragile natural values within the park. Nothing in the way of human activity will be permitted within this zone that will degrade these values. Only those structures necessary for management and preservation of the wilderness qualities of this zone will be permitted. Most often this will consist of only simple unobtrusive guard outposts.

Primitive Zone: These natural environment lands often abut the Primitive-Scientific Zone. They too contain outstanding natural features. However, the lesser overall environmental quality of these lands and/or the need to make the park's significant features available to visitors brings about the need for this zone. Primitive Zone lands also serve as transition or buffer areas, often separating Primitive-Scientific Zones from more accessible park zones. Exotic plants and animals will not be introduced and if possible will be eradicated in this zone. Physical development will be restricted to rudimentary trails, simple campsites, guard outposts, and minimal research facilities. Roads and motorized vehicles will be prohibited.

Extensive Use Zone: This classification is necessary to provide visitors with high quality park environment that is easier of access. Within this zone, park roads, trails, simple campgrounds, scenic overlooks clearing will be permitted. Development, however, will preclude facilities that will encourage high density use such as visitor centres, hotels, etc. Every effort will be made to reduce the environmental impact of physical development on this zone. As with the Primitive Zone, these lands will often function as a buffer or transition to more protected zones.

Intensive Use Zone: This is the zone of high-density visitor and management use. Such lands, usually comprising a small percentage of the park's total area, designate lands to be used for roads, visitor centres, visitor supply stores, formal campgrounds, overnight accommodations and park administration officers. These are the lands that are most affected by visitor use. As with development in other zones, extreme care must be taken to lessen the impact of physical development on park values. Caution must be exercised to prohibit development either in kind or in degree that will hint of urbanization. Facilities for public use placed in this zone should be the minimum required to promote visitor enjoyment and safety as well as resource protection.

Historic-Cultural Zone: This classification is given to lands within the park boundary containing nationally

and internationally significant archaeologic, historic or contemporary cultural resources. This classification is important, for it directs attention to the importance of protecting and interpreting these vestiges of the nation's cultural heritage. Often it becomes desirable to provide a setting for these zones with abutting Primitive or Extensive Zone lands. Physical development will be only that necessary for the preservation, restoration, and interpretation of cultural values. Public use activities are generally limited to sightseeing and education.

Zone of Recuperation: Lands within park boundaries that have been altered by the introduction of exotic animals, plants, mining, cutting, burning, colonization, farming, etc., bring about a need for this zone. Once the management goal for these lands has been determined an action programme will be set in motion, directed at recuperation. Installations and equipment necessary to facilitate the implementation of these programmes will be permitted within this zone.

Special Use Zone: This zone is used for designating lands required for basic management services such as employee housing, maintenance and storage facilities, water and electric plants, communication towers, sanitary land fills, borrow pits, etc. Insofar as possible these installations will be visually and acoustically isolated from visitor use areas. This zone also is used to designate lands which support land use practices incompatible with park objectives. In the latter case these designations are transitory being only necessary until corrective action can be taken through park management or land acquisition programmes.

- Resource protection. National park management is concerned with the well-being of total environments as opposed to the protection of individual features. However, in the preparation of resource management programmes it is desirable to break apart the total problem of management into more easily handled segments.

For natural areas consider the need for management procedures, directed as safeguarding vegetation, wildlife, and other natural features against impairment or destruction. This will involve more than passive protection. It will require action programs involving the application of ecological management techniques which are often necessary to neutralize the unnatural influences of man. Typical resource protection categories include, but are not limited to, fish and wildlife management; poaching control; fire control or regulation; and water pollution control. Each park will have specific problems which will require evaluations and solutions. Parks with cultural features will require additional management programmes that are concerned with historical and archaeological investigation and restoration as well as programmes designed to establish procedures for arresting the damaging effects of nature and man on cultural remains. Typical management programme needs at historical areas are those concerned with the maintenance of buildings, their settings, furnishings, equipment and grounds. In areas where living history programmes are appropriate, these activities will require action programmes.

Protection problems concerned with the visitor also will be treated in this section. These will vary with the kinds and numbers of visitors who are expected to use the park and the type of activities and facilities available.

- External influence. These include air and water pollution, cattle intrusions, poaching, bush fires etc. Here it should be outlined how will be dealt with these problems. The management should establish good relations with the population surrounding the park as a working base to deal with effects

from outside. As much as the park resources have to be protected against detrimental effects from outside, so have crops outside the park to be protected against effects from inside the park, and in case damage has been done this should be refunded. Fires started outside the park for agricultural purposes might sweep across the boundary. Preventive programs will be outlined here.

5b. Management for research.

In most national parks scientific research and study concerned with the retention of natural and cultural values is an important management objective. As appropriate, programmes must be planned

in terms of research and study needs for the park as well as for meeting the needs of the scientific community. Consider the demand for scientific use. This will depend upon the characteristics of park resources and the interest of scientific institutions who may wish to use the park. Cite specific research projects that will be needed in the park, research personnel if the situation warrants, and research facilities and equipment needs. Scientific uses will be carried out by permission and be controlled by the local park administrator.

5c. Management for education.

National parks and park personnel can make significant contributions to the advancement of education, concerned with man's relationship to his environment. Because national parks are ideal laboratories for this activity, a broad programme to promote environmental education becomes a necessary management programme requirement. The plan often involves the cooperation of schools, universities, publishers and other organizations for assistance in communicating an environmental consciousness both within and beyond the park.

In a national park context, interpretation is the learning activity which reveals meanings and relationships of natural and cultural features. For this purpose facilities and services are provided in parks to orient visitors to park opportunities; enhance visitor enjoyment and understanding of the park; and accomplish through interpretation the basic management objectives of resource protection and visitor safety.

Because learning in a park is a recreational activity, it must be carried out in such a way as to stimulate visitor interest and curiosity. Programmes for this purpose are usually called interpretive programmes and utilize such media as personal contact, slide or film shows, guided or self-guiding walks, publications, exhibits and recorded messages. An education centre or simple museum, attached to park headquarters or to the permit-selling post at the entrance of the park, can be extremely useful.

5d. Management for recreation.

Use for recreation will often bring about the need for specific management programmes. After a thorough examination of park resources along with an understanding of visitor characteristics, decide what recreational opportunities will be offered to visitors. In a general way state where they will take place. Such activities will be in keeping with the character of the park and must not conflict with other objectives. Determine the demand for various recreation activities. Suggest the kinds of facilities

and equipment that will be needed. Indicate how visitor participation will be managed. Indicate if a separate management programme will be required. Typical recreation activities requiring management programmes include, but are not limited to, interpreation, organized group camping, boat trips, tour drives, hiking, viewing from hides and towers.

5e. Management of the estate.

The execution of the above mentioned programs require a more or less comprehensive service system. This includes access roads to the park, roads inside the park, bridges, causeways, footpaths, guardposts, visitor and staff accommodation, camping grounds, hides, watch towers, buildings for educational and research purposes, transport, equipment, plants, etc. A programme should be prepared for the development and maintenance of this service system.

6. Priorities.

Work priorities have to be outlined because it is impossible to do everything at once. This section will be the day to day guide for the manager who runs the park. In writing down the work priorities one has to give full consideration to the prime objectives which have been stated under Objectives. What is considered to be the most important objective of the park will receive the highest priority in considering the work priorities. Although parks need development, the latter is never the highest priority; although there must be a program for recreation and education, those programmes should not endanger critical habitats. Of all the sections of the management plan this one will have to be updated most often. A new program of work priorities should be ready long before the previous program expires.

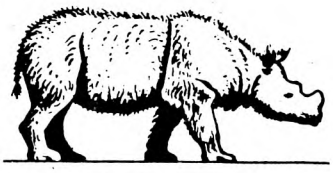
7. Responsibilities.

A description and organization diagram will be presented to demonstrate how the functions of park management are to be carried out by individual staff members as well as to specify their hierarchal relationship. In large parks or in cases where topography clearly requires that key park functions be separated into geographic units, it is useful to establish districts to give responsibilities for the management of local areas. In order to carry out the functions required for operating the park, the following types of personnel are employed:

- Management: The *manager* is the director of a given park; he is the leader of the park staff and must integrate, coordinate and stimulate them to achieve the objectives for which he is responsible. He must deal with other government agencies and organizations and local leaders, and must present and defend the image and overal programme of the park.
- Protection: The *park guards* are responsible for the protection of park resources and park visitors. They deal directly with the visiting public introducing them to the park and guiding them to enjoy their activities in ways compatible with overall park policy and regulations. They spend a great deal of their time in the interior of the park where they represent both law enforcement as well as the key source of information to the visitor.
- Interpretation: The *interpreter* is responsible for the information, orientation and educational aspects of the park. He "interprets" the values and features of the park and presents them to the park visitor in a manner which can be appreciated at all levels of language and culture.
- Maintenance: The *maintenance specialist* is responsible for the proper functioning and upkeep of all park installations and facilities.
- Administration: The *Administrative officer* is responsible for the overall operational aspects of the park. He works closely under the park manager and reports to him on the execution of park projects, financial status, personnel and inventories of equipment and supplies.

Appendices.

Appendices include: maps (topographical, water resources, vegetation etc.), description of boundaries, park rules, time schedules and finances of the programs, list of equipment, checklists of mammals, birds, reptiles, amphibians, fishes, and plants, a list of references, and all other data which contribute to the better understanding of the area to be managed. JHK.



DICERORHINUS SUMATRENSIS OR DIDERMOCERUS SUMATRENSIS?

by Nico J. van Strien

In zoological publications of the last decades both names are used for one and the same animal - the Sumatran or Asiatic two-horned rhinoceros. *Dicerorhinus* is most frequently used, especially by palaeontologists dealing with fossil relatives of this small, hairy rhino. The name *Didermocerus* is very popular among zoologists in SE Asia. The respective supporters of *Didermocerus* and *Dicerorhinus* each claim that they are using the correct name and have good arguments for doing so.

In general the oldest, correctly published name will be the valid name for a certain species. To decide what is correct and what is valid, a number of rules are laid down in an International Code and an International Commission on Zoological Nomenclature is instituted to decide in matters of conflict.

In this case, the name *Didermocerus* was published prior to *Dicerorhinus,* but the latter was universally used until 1951. In that year Ellerman and Morrison-Scott rehabilitated the older, but almost forgotten, *Didermocerus,* and a number of zoologists followed their example.

On the other hand, many others refused to change the name that had been common usage for so many years. Doubt was also expressed about the validity of the publication of *Didermocerus,* since this name first appeared in a sales catalogue of a zoological collection. From then on, both names were used in literature.

In 1967, Boylan brought this confusing and impractical situation under the attention of the International Commission and asked it to decide in this matter. A survey of the recent usage of both names was made, the comments of specialists were heard and in 1974 a final advise to the Commission was published.

It was concluded, that *Didermocerus* was indeed validly published, but that this name has to be suppressed in favour of *Dicerorhinus,* because of the prevailing usage. So the right name for the Sumatran rhinoceros is *Dicerorhinus sumatrensis* (Fischer), 1814. It is hoped that the other name will become extinct before the Sumatran rhino itself, but that is a different story.

GAME RANCHING - AN ANTIDOTE TO WILDLIFE EXTINCTION

by Nelia C. Quinones

Our wildlife's future is undiscernable. The world in which they exist is getting smaller and simpler. The forests, the rivers, the seas, and the skies which have sustained their lives for eons are being slashed, burned, eroded and polluted, as the case may be, at very alarming rates. The increasing world population wants more of the remaining wildernesses. At this stage, several species of mammals, reptiles, apes, and forms of aquatic life are now either extinct or endangered. Not even the move to set aside nature reserves under the National Parks and Wildlife Conservation Program of the International Union for Conservation of Nature and Natural Resources (IUCN) has been able to check the rapid decline of wild species in their natural habitats.

At present, there are about 1,200 national parks and equivalent reserves in about 140 countries (IUCN, 1971) but these chains of parks don't seem to assure perpetuation of animal life extant to every country. Reports continue to indicate that more and more species are being exploited excessively without due regard for conservation and natural replenishment.

In the Philippines, there are about 61 national parks and 6 game refuges and bird sanctuaries (List of Philippine National Parks, Parks and Wildlife Office, Manila) with an aggregate land area of 1,964,000 hectares representing about 6.5 percent of the Philippine land area. These nature reserves are of intricate mountain and island ecosystems that support much of our endemic wildlife. But the status of these areas is not certain; they usually lose out in competition with other land-uses that bring quicker commercial returns, or in support of the population of poor who encroach on the reserve as a matter of survival.

Game ranching

"Game ranching is the organized and scientifically based utilization of free living wild animals for human needs" (Mossman, 1975). Population growth of wild fauna, especially big game, is maximized and harvest of animal products such as meat, hide, fur, etc. is more or less on a commercial scale. Such concept is similar in many ways to the raising of cattle, sheep, poultry and hogs.

Single-species game ranching was first initiated in Alaska during the early 19th century. The reindeer industry through domestication of the reindeer *(Rangifer tarandus)* has been flourishing since 1951 (Hanson, 1952) Likewise, the first known multiple game ranch operation started in 1930 on the 9,600 acre Sandhill Game Farm in Central Wisconsin (Mossman, 1975). Extensive game ranch operation is prevalent in Texas wherein eight most important species occur by the hundreds (Teer, 1975). They are Axis deer, 6,450 in 69 ranches, 4,125 Black-buck antelope in 56 ranches; 1,300 Aoudad in 40 ranches; 10,000 European wild hogs in over 100 ranches; 4,000 Nilgai in 7 ranches; 875 Sika deer in 22 ranches, and 445 Fallow deer in 43 ranches. Other game ranches abound in other states in North America, and in countries like Rhodesia, South Africa and East Africa.

Reindeer

Saving endangered species

Most of the endangered wildlife species in the world are of great value to humans - primarily for food and secondary for aesthetic reasons. The declining population indicates a liability - which can be reversed into an asset once scientific management of wildlife is undertaken. Example of exotic species saved from the brink of extinction is the North Pacific fur seal and two species of antelope: the Russian saiga and the American pronghorn (Yoakum, 1975). Other endangered species like rhinos, elephants, tigers, etc. can as well be saved. Some endangered Philippine wildlife which deserve protection are species of deer *(Rusa)*, wild hogs *(Sus)*, the tamaraw *(Anoa mindorensis)*, species of monkey *(Macaca)*, Scaley anteater *(Manis javanicus)*, Palawan

porcupine *(Thecurus pumilis)*, mouse deer *(Tragulus nigricans)*, 2 species of crocodiles, 3 marine turtles, and others.

Productive use of marginal lands

Of the country's 30 million hectares land area, about 6.5 million is open grassland (UNESCO, 1974). This is characterized by strongly sloping, undulating, rolling, hilly or mountainous landscape. About 2.1 and 1.5 million ha of the grassland area are covered by pasture leases and communal pasture lands respectively (PCARR, 1976) which more or less support an animal population of 2 million cattle; 6 million carabaos and 248,000 goats (UNESCO, 1974). The remaining land area which is left idle can be put into productive use through game ranching.

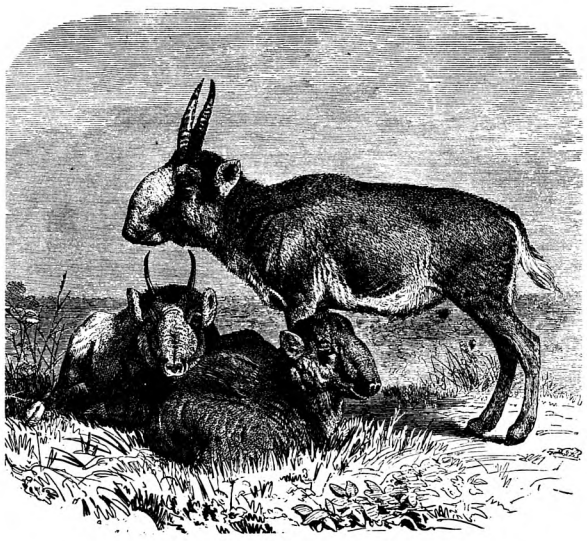
Wild animals are effective users of native vegetation. Much of the antelope populations in Canada, Mexico and continental United States inhabit grassland and grassland-shrub communities (Yoakum, 1975). In Utah, about 105,000 game animals were harvested in 1970 from waste lands which brought income to the state amounting to about $6.4 million (Spilett et al., 1975). On Texas ranges an estimated 290,000 deer are harvested each year. Over 650,000 Saiga antelopes were harvested between 1951 and 1960 by the Russians (Teer, 1975).

Economics of game ranching

Game ranching is noted for its ecological gentleness (Mossman, 1975). This can be attributed to the game's efficiency of using native vegetation and man-made modified habitats with little management. Reports indicate that wild animals cause little if any environmental damage when the population is scientifically regulated.

In domestic ranching operations, the diverse ecosystem is simplified. This requires energy inputs such as cultivation of exotic plants, chemical fertilization, irrigation, weed and insect control, disease control, etc., which demand a higher number of manhours. These management tasks add to higher production costs. In game ranching, gross capital offtake may be large which includes fencing a wide expanse of land, say a minimum of 2,000 acres, and the financial cost of game stocking. However, return of investment is reportedly easily achieved within a short span of time through sales of animal products, hunting licenses, hunting leasehold systems, lodging accommodations, and other facilities for fishing, horseback riding, hiking, camping and photographing. This is exemplified by the 2,000 acre Ulbizane Game Ranch in Zululand, South Africa, which achieved balance between income and expenditure in the fifth year (Mossman, 1975).

Game animals can also coexist with domestic



Saiga antilope

livestock. This is exemplified by the audacity of American pronghorn antelope in inhabiting Western North American ranges together with domestic cattle, horses and sheep (Yoakum, 1975). This is true in lands with abundance of water combined with a quality mixture of grass forbs and browse. Other game species' range performance with livestock coexistence would be enormous considering the minimized expenses of ranch fencing and the multiple source of income from game livestock, animal products and activities related to it.

Finally, game ranching must be viewed within the context of human welfare and the well-being of the total environment.

from CANOPY *February 1977*

References

Hanson, H., 1952. **Reindeer industry in Alaska.** J. Range Mgt. 5:2.

IUCN, 1971. **United Nations List of National Parks and Equivalent Reserves.** Hayez, Brussels.

Mossman, A., 1975. **International game ranching.** J. Anim. Sci. 40:5.

PCARR, 1976. **Management of native pastures.**

Spilett et al., 1975. **The use of wild and domestic animals.** J. Anim. Sci. 40:5.

Teer, 1975. **Commercial uses of game animals in rangelands in Texas.** J. Anim. Sci. 40:5.

UNESCO, 1974. **"Inventory of grassland soil"**, in Ecological inputs in Animals Resource Mgt. Man and the Biosphere, Manila. Sept. 1974.

UNESCO, 1974. **"Inventory of 1973 Animal Population"**. MAB-UNESCO. Manila. Sept. 1974.

Yoakum, 1975. **Antilope and livestock on rangelands,** J. Anim. Sci. 40:5.

AN ISLAND FOR THE KAKAPO

by D. V. Merton

Management in Fiordland, New Zealand, of the dwindling remnant kakapo *(Strigops habroptilus)* population is not practicable and, because of the species' poor record of survival in captivity and highly specialised courtship behaviour captive propagation is probably not possible. The total population is not known, but only nine birds, all males, have been located in the wild during recent searches and it is unlikely that further males will be found within the Milford or Transit watersheds, where coverage is now virtually complete.

Nevertheless, conservation of the kakapo is feasible, provided females can be secured, by the establishment of a colony on an off-shore island. This appears to offer the only hope of saving this remarkable bird. The concept of using islands as "natural aviaries" for rare and endangered animals is a proven one, and outstanding success has already been achieved by this method in the conservation of two New Zealand species.

The Wildlife Service is at present endeavouring to establish a breeding population of kakapo on Maud Island. Once kakapo are established, it is proposed to attempt the establishment there of other rare and endangered birds, and perhaps certain invertebrates and reptiles.

Maud Island (250 ha), 40 kilometres northwest of Havelock, in outer Pelorus Sound, is biologically important because it has remained free from rodents, mustelids and other mammalian predators and potential competitors. It is therefore one of few islands which are suitable for the breeding of certain endangered wildlife no longer able to survive on the mainland.

Maud Island is probably best known as one of only two localities where the rare Stephen's Island or Hamilton's frog *(Cleiopelma hamiltoni)* is found. It is a steep island rising to 350 m a.s.l. and supporting a diverse range of habitats which includes a 16 hectare patch of forest, and considerable areas of scrub, bracken and pasture. Its natural communities have been greatly modified by fire and grazing by sheep and cattle since late last century.

In 1971, 80 hectares of the island were given to the Crown by the then owner, Mr. E.J.T. Shand, for the preservation of wildlife, and were called the Tom Shand Flora and Fauna Reserve after the donor's late cousin. A further 2 hectares were donated to the Crown in 1972, and in 1975 the balance was bought by the Crown with substantial assistance from the Royal Forest and Bird Protection Society of New Zealand. The whole island is now a Reserve for the Preservation of Flora and Fauna in the Marlborough Sounds Maritime Park, and landing without special permission is prohibited. Day-to-day management is vested in the Wildlife Service.

On the recommendation of the Fauna Protection Advisory Council, the Wildlife Service has, for the past two years, given the kakapo conservation programme highest priority. This has resulted in spectacular advances in our knowledge of the species' behaviour. This knowledge is proving of great significance to management of the birds which have so far been transferred to Maud Island.

Two kakapo captured in the Esperance Valley, Milford, during March 1974 were transported on 2 April from Manapouri to Nelson, and from Nelson to Maud via helicopter. They were confined in two adjoining aviaries in a wooded area on Maud Island that night. At 11 p.m. on the following night sections of the enclosure were removed. Only one bird, however, had departed next norming. The other remained in the opened pen most of the day, but had gone by the evening of 4 April. Henceforth for the next month at least one of the two returned to the aviaries each night and took supplementary foods placed nearby. The quantities of supplementary foods provided were then gradually reduced, so as to avoid making the birds dependent on such items and to encourage them to forage for themselves.

A third bird, a male in breeding condition, released on Maud on 25 March 1975 has settled in well. This bird, and the two released previously, have established territories adjacent to one another in which sign is generally abundant.

One of the original two birds is definitely a male. The other, however, could not be sexed with certainty at the time of capture, although its smaller size indicated the possibility that it might be a female. It is intended that this bird should be caught and sexed in August 1976.

No female has been identified with certainty in the last few years. With the recent discovery of two courtship arenas in use in the Milford area, however, it would seem that the chances of securing

Kakapo (Merton)

females during the next booming season - whenever that might be - have never been better. Efforts are now being directed entirely to finding, catching and transferring females to Maud.

Regular and discreet inspections have been made to monitor the activities and welfare of the Maud Island birds and they have been seen and heard on a number of occasions. Although they appear not to have been perturbed by our presence, we have avoided undue disturbance.

The male released on the night of 3 April 1974, known as "Jonathan", occupies a territory which includes the upper southern corner of the forest and much of the adjacent bracken.

The unsexed bird, released at the same time and tentatively named "Jill", occupies an area on the southern margin of the forest and the bracken area to the south.

The male, released on 25 March 1975, is known as "Richard Henry". He has established a territory near the upper northern forest edge and ranges well down the northern forest edge and adjacent bracken-covered slopes.

During visits all areas have been checked for sign (feeding, droppings and feathers), and droppings have been collected for analysis. Gut fauna and flora from each bird have been identified and the Department is giving financial assistance to a M.Sc. student, who is studying foods of Maud and Fiordland kakapo by field observation and the identification of plant cuticles from droppings. Findings will benefit management of the species on Maud Island.

During the winters of 1974 and 1975, approximately 400 autumn-fruiting trees and shrubs, as well as herbs and grasses, were planted. Some of these, such as apples, pears, crab apples, gooseberries, *Corposma* species, toetoe, flax, tussocks, spaniard, *Astelia,* carrots, sun-flower and oats, are known to be palatable to kakapo; while others, such as cherries, plums, currents, guavas, strawberries, raspberries, grapes, wheat and corn, are sought after by frugivorous birds and are presumed to be palatable to kakapo. The object in planting these autumn-fruiting species is to try to simulate the massive flush of fruit and seed which occurs in Fiordland during the autumn and which appears to be an important factor in enabling kakapo to breed successfully. Although domestic stock on Maud have hindered the establishment of some plantings, a high percentage has survived.

Eight artificial water catchments, each with 2-3 troughs, have been constructed in areas fre-

quented by kakapo, and these have required maintenance during visits. During dry summers, such as that of 1974/75, the natural water courses on Maud are all but dry, and so the catchments provided are considered important. However, the birds seem to prefer the natural water supplies and, during dry summers, move to those parts of their territories where permanent seepages exist.

With the purchase of Maud by the Crown and the reduction of stock numbers, growth of pasture, fern and scrub has been prolific. This has favoured conditions for kakapo which require cover, and feed on blades of grass and seedheads as well as on roots, stems and fronds of bracken and other ferns.

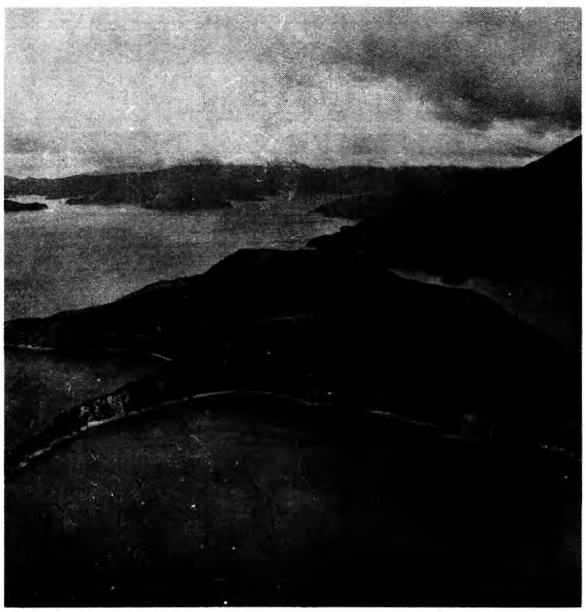
The bull-dozed roads on Maud are favoured by the kakapo which use them extensively for feeding, loafing and access. These roads also provide access for management staff. With the reduction of stock numbers these tracks are becoming overgrown and unless maintained will ultimately become impassable.

As a result of continued vigilance by Wildlife Staff and Mr. Shand, who continues to reside on Maud Island, we are now confident that wekas *(Gallerallus australis)* have been eliminated. The weka is a highly efficient predator of the eggs and young of ground nesting species and is alien to Maud Island.

Perhaps the most exciting observation was made on the night of 14 December 1975 when Wildlive Officers saw, and for several hours heard, a male kakapo "booming" strongly from crude display bowls it had developed. This proved beyond doubt that birds on Maud are capable of achieving breeding condition in this "natural aviary". Apparently, this bird did not persist in his courtship activities as subsequent observers failed to hear the call. The call, which can be heard for up to 4 kilometres, is generally heard in Fiordland for several hours each night during about two and a half months in midsummer (approximately early December - mid-February), the early part of the breeding season. The Maud Island bird adopted as booming sites shallow caves and depressions formed by sheep camping against the steep bank on the upper side of a bulldozed track. Some of these depressions are virtually identical with those seen in Fiordland and which have been excavated by kakapo and used traditionally for booming purposes. However, it seems likely that disturbance by camping sheep may have caused the Maud Island bird to cease his courtship activities prematurely.

There is no doubt that stock and kakapo are incompatible. However, it may be possible to confine a small number of sheep to graze parts of Maud Island which are not frequented by kakapo and thus maintain a more diverse habitat for other rare species.

During dry summers the risk of fire on Maud is very great, and, together with the risk of undue human disturbance, it is vital that visitors be strictly controlled and numbers kept to a minimum. Visiting boats also pose a risk of rats, mice and cats reaching the island. Should any such mammal become established, the island would immediately become unsuitable for breeding most rare species including kakapo.



Maud island (Kendrick)

The Maud Island project shows every indication of success. The three birds released there have settled in remarkably well and no losses have occurred; two birds have now survived for more than two years and another for over one year; and one male was observed booming, so demonstrating that birds there are capable of achieving breeding condition. *Nevertheless, the ultimate fate of the venture, indeed survival of the kakapo, depends entirely upon the result of our current efforts to capture and transfer females to Maud Island.*

from **Wildlife-a Review** *7/1976*

ELEPHANTS IN THAILAND: IMPORTANCE, STATUS, AND CONSERVATION

by Boonsong Lekagul and Jeffrey A. McNeely

Elephants are very important in Thailand, economically, socially and culturally. However, they are rapidly becoming scarce and within the next 10 years will be seriously threatened with extinction. A method of conserving some elephant populations is briefly outlined, and two "Elephant Ranges" are proposed.

Current Status in Thailand

Thailand remains an important country for elephants in Southeast Asia, though their numbers are declining rapidly. From 13,397 domestic elephants in 1950, their population fell slowly to 11,022 in 1969, then catastrophically declined to 8,438 in 1972 (more recent figures are not available). In the 20-year period 1950 to 1969, 1,138 elephants were exported. At an average value of $1,000 each, the earnings from elephants in this period amounted to US$1,138,000.

It is quite likely that many of the domestic elephants came from Burma and Cambodia, with relatively few coming from Laos. However, the political changes which have taken place in Indochina in recent years have virtually cut off the trade in elephants and have made migration by wild herds very hazardous (due to landmines, boobytraps, and hunters or soldiers living off the land). Thus as the population of domestic elephants suffers from natural mortality, new recruits will be able to come only from within Thailand (though Burma may still contribute a few).

The wild population from which these recruits must come is very difficult to determine due to the lack of field studies; we thus prefer to call our figures "guesstimates" to emphasize their tentative nature. Whereas elephants were once found throughout the country (when the country was 80% forest), they are now becoming much more confined to the hilly areas which have the only remaining forests.

Within these limits, there are still some good areas for elephants, including the Petchabun range from Chaiyaphum to Loei, Khao Yai National Park and the Dangrak range, the mountains of western and northern Thailand from Mae Hong Son south to Chumphon, and the mountains of the peninsula from Ranong to Trang. Our population "guesstimates" are as follows:

Petchabun Range:	200- 500
Khao Yai N.P.:	100- 150
Dangrak Range:	100- 200
Peninsula:	900-1500
North:	400- 600*
West:	900-1500*
Total	2600-4450

* includes seasonal migrants from Burma

Protective Legislation

Elephants have been protected in Thailand since the early days of the Chakri Dynasty, when the Department of Royal Elephants was directly

responsible to H.M. the King; by law, all wild elephants belonged to His Majesty and special permission was required to capture them, with a certain percentage of the captured elephants going to the King. The Wild Elephant Protection Act of 1921 made all wild elephants the property of the government, under the jurisdiction of the Ministry of the Interior; under this law, anyone who killed or endangered an elephant in any way (except under direct attack by an elephant) is subject to a fine of 1,000 baht ($50.00) and up to three years imprisonment. The Wild Elephant Protection Act was updated in 1960 (to increase the fee for capturing a wild elephant) and remains in force. In addition, elephants are totally protected, along with all wildlife, in the 15 National Parks and 12 Wildlife Reserves in the country, totalling an area of 33,500 km^2.

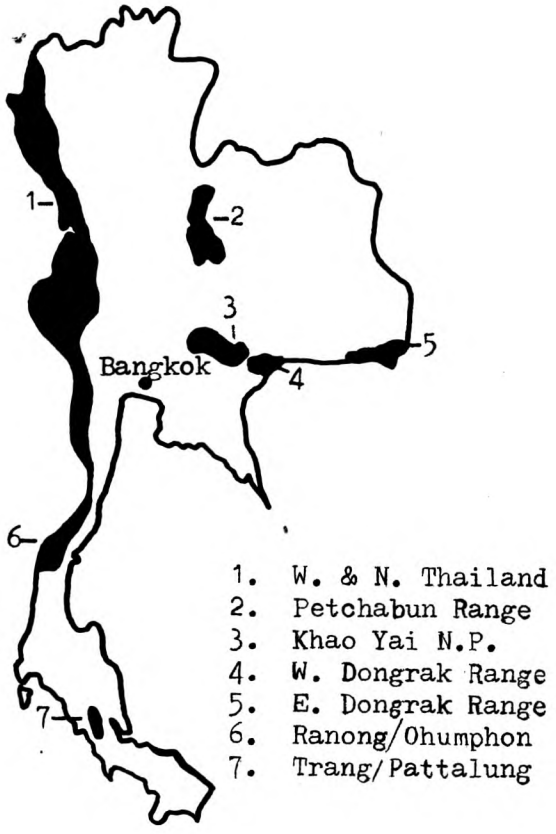
Managed Elephant Ranges

In view of the recent rapid decline of elephants in many parts of their range, the IUCN has felt that there is an urgent need for a central body to monitor elephant populations on the African and Asian continents. The IUCN and the Survival Service Commission have now formed an Elephant Specialist Group, whose objective is to determine the current status and future prospects of the African and Asian elephants. It is felt that by surveying the whole spectrum of man, elephant, and habitat interactions, the information needed to manage elephant populations and their habitats can be obtained.

Robert Olivier, co-chairman of the Asian Elephant Sub-Group, has studied elephants in Malaya for several years and has surveyed elephant populations elsewhere in Asia and Africa. Based on this work, he has developed the concept of Managed Elephant Ranges, where substantial areas which include the entire annual range of a healthy elephant population will be managed for maintaining the elephants. Such an Elephant Range would not necessarily exclude human use of much of the area, since Olivier found that in Malaya, elephants require 5 times the range in primary forest as in disturbed forest; the early successional stages of regenerating forest have more of their plant biomass within reach of the elephants rather than in the canopy, providing the primary plant productivity necessary to support elephants.

Elephants are thus likely to benefit from limited human use of the forested uplands, including selective logging, traditional hunting, bamboo extraction, and slash-and-burn agriculture (if it is done at traditional population densities at a *sustained-yield* level for the system). It seems quite likely that such limited use is in fact the optimal long-term human use of the forested uplands.

We have taken Olivier's basic idea (Olivier, in press) and applied it to Thailand, recommending that two Elephant Ranges be established, one in the



Petchabun Range in the northeast, the other in the Tenasserim Range of western Thailand. Each will contain four already-existing National Parks or Wildlife Reserves, with further additions of reserved forest areas. The Ranges will be zoned for multiple-use, retaining current administrative structures in the National Parks and Reserves (where all extractive human activities are prescribed); however, the areas currently outside the parks or reserves will also be managed for elephants in coordination with certain appropriate human activities.

Both proposed areas are very important as watersheds, and by managing them as Elephant Ranges, the beneficial effects to the watersheds will add to the longevity of the dams and reservoirs in the areas, as well as creating the possibility of controlling land use more effectively than has heretofore been the case (McNeely, 1975).

The Petchabun Elephant Range

The Petchabun Elephant Range, including 4,111 sq. km., is located in northeast Thailand, in the Petchabun mountains which form the watershed boundary between the Chao Phya river and the Mekong river. The proposed Elephant Range stretches from Phu Kheo Reserve north to Phu Luang Reserve, a distance of about 140 km; the Range also includes Nam Nao and Phu Kadeung National Parks. The area is forested in a wide range of forest types, including Hill Evergreen, Dry Evergreen, Coniferous, Mixed Deciduous, and Dry Dipterocarp. The Range is bisected by a new highway from Chumphae to Lomsak, through Nam Nao National Park; there is considerable encroachment by squatters along the road, which is also used by illegal lumber trucks. The Chulaporn Dam is within the proposed Range, between Nam Nao and Phu Kheo; there seems to be minimal settling around the dam (in marked contrast to other dams in the northeast); the reservoir from the proposed Pa Mong dam will reach the northern part of the proposed Range.

The Petchabun Elephant Range is still rich in wildlife, and includes the Sumatran rhinoceros (which may be as migratory as the elephant) (McNeely and Cronin, 1972; McNeely and Laurie, 1977), Gaur, Banteng, Tiger, Red Dog, Leopard, and probably Clouded leopard. Other species include Lar gibbons, macaques, langurs (living in limestone caves), Sambar, Barking deer, Wild pigs, and a wide range of smaller mammals and birds. Elephants have a population of 200-500; they are known to migrate between the various parks and reserves, though the expansion of maize agriculture between Nam Nao and Phu Kheo, Nam Nao and Phu Kadeung, and Nam Nao and Phu Luang suggest that these areas should be combined as quickly as possible to ensure the survival of the migration routes of the elephants.

Parks and Reserves included in the Petchabun Elephant Range are:

	area
Nam Nao National Park	990
Phu Kadeung N.P.	348
Phu Kheo Wildlife Reserve	1425
Phu Luang W.R.	848
Reserved Forest	500
Total	4111 km^2

The Tenasserim Elephant Range

The Tenasserim Elephant Range, named after the mountain range separating Burma from Thailand, extends from Petchaburi Province in the south (12° 30' N) to Tak Province in the north (17°50' N), stretching a distance of roughly 500 km and covering an area of over 12,000 sq. km. This area is mostly forested, containing all of the forest types found in the Petchabun Range, but with drier types dominating; there are wide areas of grasslands or fire-climax savannas, as well as large areas of bamboo (which are currently being harvested for pulp). This Range includes Erawan Falls National Park and Huay Kha Khaeng, Salak Phra, and Thung Yai wildlife reserves.

When the Chao Nen Dam on the famous River Kwai is completed in 1979, the new reservoir will extend into the center of the Range, thus forcing elephants to change their migration routes, but also offering the opportunity for viewing elephants by boat (as in Periyar Sanctuary in southern India). This part of Thailand is famous for its great animal migrations, when elephants, gaur, and rhinos (at least in previous times) all moved into Thailand from Burma during the rainy season and back to Burma with the coming of the dry season; the exact routes of these migrations are not know, but it is reported that some moved from Burma as far east as Salak Phra, crossing the River Kwai above the Chao Nen damsite.

Besides the 900-1500 elephants, other endangered species found in the Range include Fea's Barking Deer, Banteng, Gaur, Wild Water Buffalo, Red Dog, Clouded Leopard, Leopard, Tiger, Tapir, and perhaps Javan and Sumatran rhinos and Eld's Deer. Among other notable species of mammals in the area is Kitti's Hog-nosed Bat *(Craseonycteridae: Craseonycteris thonglongvai),* the most recently described family of mammals and perhaps the smallest mammal in the world, with a weight of 1.7 grams (Lekagul and McNeely, in press).

Parks and Reserves included in the Tenasserim Elephant Range are:

	Area
Erawan Falls National Park	556
Salak Phra Wildlife Reserve	947
Huay Kha Khaeng W.R.	1,650
Thung Yai W.R.	3,399
Reserved Forest	5,500
Total	12,052 km^2

Administration of the Elephant Ranges

While the concept of Elephant Ranges is still in its infancy and needs to be developed further, we do have some possible administrative structures to suggest for consideration (though details will have to be worked out by the government authorities involved). Since the Wildlife Management Division, the National Parks Division, the Watershed Protection Division, and the Forest Industry Organization are all under the Director-General of the Forest Department, it is suggested that the Director-General be the Chairman of an "Elephant Range Supervising Committee", which should also include high-level representatives from the National Environment Board, the Ministry of Defence (elephants often migrate through areas which are under the control of the military, especially in the Tenasserim Range), the Tourist Organization of Thailand, and the Electricity Generating Authority of Thailand (for coordination of developments around dams and reservoirs). The Elephant Range Supervising Committee would meet a few times a year to set broad policy and serve to coordinate the efforts of the various government departments involved.

Each Elephant Range should have a Working Committee, including a Range Manager (see below), the Chief of each national park or reserve included in the range, the commanding officer (or his representative) of the Army or Border Patrol Police unit operating in the area, and the Chief Engineer of the dams in the Range. The responsibility of the Working Committee will be to coordinate elephant management in the area, meeting as often as necessary and supporting the Range Manager.

The Range Manager (directly under the Director-General of the Forest Department?) and his Management Team will actually do the work involved in managing elephants. This will include (but is not limited to): assessment of elephant damage to crops (for later compensation to be paid by the government);monitoring changes in elephant habitat; removing such dangerous individual elephants as may from time to time appear; conducting (or facilitating) research on populations, migration routes, and habitat requirements of elephants; carrying out (or facilitating) an education campaign among the inhabitants of the area; and filing monthly reports with the Working Committee to assure that all interested parties are kept informed of progress and problems.

It is felt that by including very extensive areas within the Managed Elephant Range, a wide variety of human interests can be served, including sustained-yield forestry (worked by elephants?), shifting cultivation, tourism, watershed protection, National Parks, Wildlife Reserves, and last but not least, the conservation of elephants for the benefit of man.

References

Lekagul, Boonsong and J.A. McNeely (in press). **Mammals of Thailand.**

McNeely, J. 1975. **Draft Report on wildlife and national parks in the lower Mekong basin.** Mekong Committee, ECAFE. 191 pp.

McNeely, J. and E.W. Cronin 1972. **Rhinos in Thailand.** *Oryx* 11(6)457-460.

McNeely, J. and A. Laurie 1977. **Rhinos in Thailand.** *Oryx* 13(5)486-489.

THE ECOLOGICAL IMPACT OF DOMESTIC STOCK ON CHITRAL GOL GAME SANCTUARY, PAKISTAN

by Abdul Aleem

Chitral Gol is a narrow valley of about 80 km^2. It starts about 3 km. west of Chitral town, runs as a gorge for about 18 km. and then broadens into three sub valleys, each surrounded by high peaks. A number of small watersheds - Meran, Tangogh, Kasawer, Bakhtanshal, Bironshal, Gokhshal, Chhat, Duni, Dundini - drain into Chitral Gol, the principal stream which joins the Kunar River near Chitral town.

The elevation of the tract varies from about 1,500 to 4,900 metres; twenty-four peaks exceed 3,000 metres. The area is steep and rugged. Landslips are common causing deposition of scree and morain at the foot of the mountains. Soil depth varies from almost zero on steep slopes and areas over 3,000 metres elevation to about a metre on gentle slopes, and still deeper at valley bottoms.

The climate is dry temperate. Frost and snow start from September on high peaks and November in the valley. Snow stays till March in valleys and June on mountains. Rainfall is mostly received during December to May.

At elevations up to 2,400 metres the vegetation type is dry temperate oak forest *(Quercus ilex).* At higher elevations the type grades into the dry temperate coniferous forest with the inclusion of *Cedrus deodara* and *Pinus gerardiana.* Still higher, the latter is replaced by *Juniperus macropoda.*

The tree limit is at 3,350 metres, above which can be found: *Salix spp., Viburnum cotonifolium, Juniperus communis, Taraxacum officinalis,* and *Lactuca viminea,* along with *Festuca ovina, Poa sp., Agrostis sp.,* plus several other species.

Chitral Gol enjoyed the status of a personal Game Reserve of the ex-ruler of Chitral State and with the accession of the state, it came under the management of the Government of Pakistan. Markhor, the chief game animal, numbers were greatly reduced due to uncontrolled hunting in the transitional stage, thus to preserve the population it was declared a game sanctuary in 1971, the ownership however, remained with the ex-ruler, and his livestock was allowed to graze in the area. Because of limited grazing, the area was mostly covered with a variety of vegetation which tempted other graziers as well and due to the Governmental control, they also started visiting the valleys with their livestock. This increased the pressure on the range and also affected the wildlife occuring in the area.

The present study is an effort to determine the impact of livestock grazing on the sanctuary.

Chitral Gol is famous for the resident population of markhor *(Capra falconeri falconeri).* There is a local population of 60 persons who own 580 heads of goats and sheep and 20 heads of cattle which graze in the lower valleys in winter and in higher valleys in summer. Besides these about 600 heads from the nearby town of Chitral also visit the sanctuary in the same pattern. After the melting of snow in spring, luxuriant vegetation growth attracts graziers from the nearby valleys and livestock population reaches 3,000 in the months of July and August.

Ibex (Capra ibex)

Recent studies put the population estimates of markhor to a little more than 300. Ibex, urial and black bear also graze in the same area but they are in very small numbers.

Grazing communities remain shifting with the change of seasons. Resident livestock grazes in the lower ranges around Meran all through winter. Areas above 2,400 metre elevation remain covered with snow and little is offered as fodder for the livestock. One herd from Chitral town and two more from Balach and Bir Mogh Lasht use these ranges around Meran. With the advent of spring, snow starts melting and the annuals and perennials start germinating/resprouting. Livestock, then, starts moving towards sub-alpine and alpine grazing grounds.

The central valley in the Sanctuary, Gokshal,

forms the nucleus for livestock grazing in summer. The area is covered with alpine and sub-alpine vegetation. Palatable species comprise 90-95% of the vegetation cover. Herdsmen along with their livestock start reaching there in the first week of July and stay up to the middle of September. Towards the end of summer, vegetation is almost used up and the vegetation cover devoured.

Impact on vegetation and soil

Ungrazed areas (selected in remote areas where it was known that no livestock had grazed) were compared with grazed ranges. As the comparison was made after one season of close observation, few changes in the vegetation complex could be determined. One important observation was the presence of relatively more forbs than grasses in the grazed area as compared to the ungrazed areas. The forbs accounted for 78% of the ground flora in the grazed areas and 63% in the ungrazed areas. The presence of unpalatable forbs and shrubs was relatively higher in the grazed areas. Typical examples were those of *Daphne olecides, Prangoa sp.* and *Ferula narthax.* The palatable perennial grasses like *Bromus, Elioaurus, Poa* and *Agrostis* were more abundant in the ungrazed areas.

Growth conditions were magnificient and almost full density (90-100%) flora was observed before the onset of the growing season. Species found in abundance were: *Polygonum mucronatum, P. gilseii, Ferula narthax, Prangoa pabularia, Lonicera sp.*, and *Cotoneaster sp.* among others.

Ferula and Prangoa together accounted for almost 25% of the ground cover. During summer Ferula and Prangoa were the least desired species. But towards the end of the summer grazing season, even those were devoured by the livestock and the total cover was reduced to only 1.0-2.5% whereas it was 70% in the ungrazed area (the sample was reduced as even these areas were not spared by the livestock). Transects laid out in winter ranges in late January/February showed a coverage of only 0.5% to 2.5% whereas more than half the species were unpalatable.

The forests in the sanctuary are heading towards a natural death. The existing trees are mature to over mature. Top branches have been dried up in most of the trees. This is especially true for deodar *(Cedrus deodara)* and chilgoza pine *(Pinus gerardiana)* on the lower elevations. *Quercus ilex* trees are also overmature.

The areas were compared with Chhat valley which was closed to grazing up until 1970. There exists a medium density deodar forest. The saplings are quite common in the area but seedlings of the age 1 to 5 years are almost lacking which shows the effect of grazing. Soils have been compacted due to overgrazing. This has also affected the seedling survival. For the livestock even the precipitous slopes are not out of reach. Few seedlings/saplings were observed on such slopes. *Pinus gerardiana* seedlings were not even seen. Seedlings of *Quercus ilex, Piatacia mutica* and *P. khinjak* were present only in 3-4% of cover transects.

Urial (Ovis orientalis)

Salix sp. due to their hardy nature, location in proper habitat and extremely good regenerating capacity and the unpalatable *Myricaria,* however, were thriving well along water courses. Near the hutments, water points and around the corrals, the grazing pressure was found to be very severe and even *Salix* and *Myricaria* could not survive.

Soils are deep in the valley bottoms which bear most of the burden of trampling by the livestock. The soils are compacted and this affects the soil texture and soil moisture conditions. The sheared rocks on the slopes are transported down by the livestock treading upon them and/or loosened to be washed down. The area is out of monsoon range, thus the danger of erosion with the run off is very little in summer. The valleys are fully covered with snow in the winter and the rains are received in spring when the snow also starts melting. This is the time when the ground flora has not yet made its appearance. Snow melt from the slopes gathers soil particles and these are transported to the valleys where due to soil compaction the infiltration capacity is considerably reduced and the run off is increased. Rain water helps the procedure and the soils are transported down to the stream beds. The whole valley is practically converted to a network of streams. No studies on the sediment load were

conducted. But the difference in water quality made things clear. Whereas the flowing water is almost clear in winter, it turns to semi - clear on the summer mornings and almost muddy on the summer evenings when the snow melt (due to day-sun) joins the flow.

Markhor (Capra falconeri)

Impact on wildlife

Wild animals come in direct competition with livestock. The food taken by the goats and sheep is almost the same which is relished by markhor, the principal game animal in the Sanctuary. Markhor by its habits is shy of other forms of life and does not come in contact with the herds under normal circumstances. The presence of livestock in summer grazing grounds compels the animals to leave the area in favour of some secluded grazing grounds. There are very few such places which are not disturbed by the livestock as a result of which markhor herds are broken up and the individuals or small groups of animals roam about and move over large areas in search of food. They also cross over the boundaries of the sanctuary and are shot by ever watchful hunters. During the winter visit, it was observed that the graziers refrained from grazing their livestock around the camps and just after 5 days markhor started visiting the areas where there was no disturbance. Their grazing schedule also becomes more precise i.e., they prefer to graze at a time when there is no apprehension of having combats with other forms of life and the areas remain confined to them only.

The presence of livestock in the vicinity attracts the predators - mainly wolf. This can have contrasting effects. On one hand the pressure on the wild forms is decreased and they have better chances of survival whereas solitary individuals of younger ages trying to near the habitations may fall easy prey to the predators on the other.

Markhor may occasionally mix with the herds and carry disease with them. At least one case of death in Markhor was caused by Anthrax, a common disease affecting livestock.

Factors associated with domestic stock

The graziers lop trees for three purposes. Firstly to provide browse for the livestock in the form of fresh leaves, during winter, to supplement their food in the times of scarcity, secondly to provide for fencing of the corrals and thirdly for the much needed firewood. *Quercus ilex* is the preferred tree for the purposes and is continuously lopped. The tree responds to lopping, and the new shoots and leaves tend to be more thorny and unpalatable. In the absence or near lack of ground flora in winter, oak leaves are the sole food of markhor, the quality of which is greatly reduced. The habitat and quality of range in this way is largely decreased.

In the absence of other tree forms in Gokhshal, lopping for fencing and for burning remains confined to deodar trees only, the tree does not respond well to lopping, thus causing decrease in normal growth. Excavations are made in the stems of *Pinus gerardiana* and the wood is used as torches to provide light and fire. This renders the trees weak and they ultimately topple down.

Markhor shooting has been banned in the sanctuary but reports about their killings have continually been received. The graziers are a constant source of poaching. They try to shoot the animals or help other poachers in hunting them. Solitary animals wandering in remote places are not spared and shot down. Sometimes they act as informers/ guides for other people in their search for the hunt. The markhor driven out of the sanctuary limits are also chased and shot down.

Conclusion

Presence of domestic stock within the limits of the sanctuary has adversely affected the quality of the range for markhor, the preservation of which is the sole purpose of the declaration of the area as game sanctuary. Steps must be taken to stop the ruthless waste of resource. Entry by the stock visiting the area from adjoining valleys should be completely banned. Efforts should be made to commute the grazing rights of the local population. With the

growing awareness of environmental preservation, it would be worth while to maintain the area as a Biological Reserve.

The author is Wildlife Management Specialist at the Pakistan Forest Institute, Peshawar.

Selected references

Beg, A.R. and Ilahi Bux 1974. **Vegetation of scree slopes in Chitral Gol.** Pakistan Journal of Forestry. Vol. 24, No. 4.

Hodd, K.T.B. 1969. **The ecological impact of domestic stock on the Gir Forest.** IUCN Eleventh Technical Meeting, New Delhi, India. Proceedings. Vol. 1, 259-265.

Khan, Ali Akbar 1974. **Chitral Gol Sanctuary for Markhor.** Pakistan Journal of Forestry. Vo. 24, No. 3.

Khan, M. Anwar 1973. **Rangelands of Pakistan. A study.** National Range Management Committee. Islamabad.

Severson, Keith, May, Morton and William Hepworth 1968. **Food preferences, carrying capacities, forage competition between antelope and domestic sheep in Wyoming's Red Desert.** Science Monograph 10. Agricultural Experiment Station, Laramie, University of Wyoming, U.S.A.

Yoakum, J.D. 1975. **Antelope and livestock on rangelands.** Journal of Animal Science. Vol. 40, No. 5.

A MAMMALIAN INVENTORY OF ST. PAUL SUBTERRANEAN NATIONAL PARK, PHILIPPINES

During the period from April to July 1976 two Peace Corps volunteers conducted an inventory of mammals found in the St. Paul Subterranean National Park, Palawan, Philippines. A land bridge once connected Palawan with Borneo, resulting in the northward migration of many Malesian mammals. Thus, Palawan has flora and fauna of Malesian origin distinct from the rest of the Philippines. St. Paul Subterranean National Park was established on the mainland to perpetuate this unique heritage. Covering almost 4,000 hectares along the west coast of Palawan, about 70 kilometers north of Puerto Princess City, the park consists of a series of rounded limestone mountain peaks with an underground river running four kilometers from its source to the South China sea.

The purpose of the inventory was to determine the presence of (1) mammals endemic to Palawan and (2) those species unique to Palawan within their Philippine range. Primary targets of the mammal survey included the Palawan tree shrew *(Tupaia palawanensis)* the Palawan porcupine *(Thecurus pumilis)* and the Palawan stink badger *(Suillotaxus marchei).* Also sought were Binturong *(Arctictis binturong),* the Scaly anteater *(Manis javanicus)* and the Oriental small-clawed otter *(Amblonyx cinerea).* A secondary objective of this project was to determine the extent of lowland forest suitable for the conservation of these mammals.

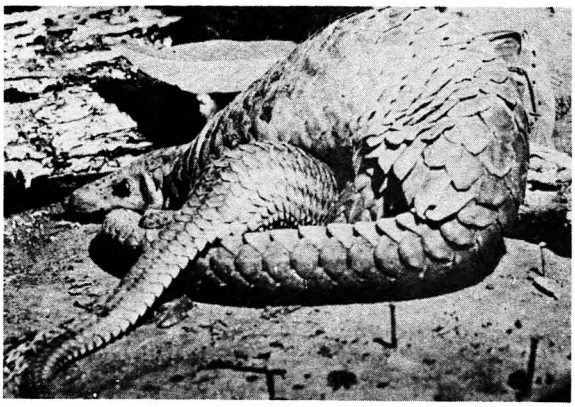
A total of 21 animals were encountered during the two and a half month period including two mammals endemic to Palawan, the Palawan porcupine and the Palawan stink badger. A third, the Palawan tree shrew, was also believed to be present. In addition, 3 Palawan peacock pheasants, also an endemic species, were captured.

All species unique to Palawan within their Philippine range were captured including the Binturong, Scaly anteater and Small-clawed otter. Other animals captured included the Palm civet *(Paradoxurus hermaphroditus),* the Oriental civet *(Viverra tangalunga)* and the Monitor lizard *(Varanus salvator).*

The extent of lowland forest within the park was considered to be insufficient and a recommendation is being made that a large area of undisturbed lowland forest along the eastern boundary of the park be annexed.

A second expedition to St. Paul is planned by the author in the corresponding period of 1977. An attempt will be made to map the underground river and complete the resource inventory, preparatory to writing a "master plan". A full report of this project and its recommendations will be published by the Department of Natural Resources.

Rick Schneider
P.O. Box 2702
Manila, Philippines



Scaly anteater (Wong)

WILDLIFE PRESERVATION IN THE KINGDOM OF BHUTAN

by C. Dorji

The kingdom of Bhutan is bounded by China to the north and India to the south and east and has a geographical area of 47,000 km^2. The altitude ranges from 98 m. to 7,400 m. Forests cover 60% of the total land area and consist of the following types: 1. Tropical forest (foot hill plain to 1,700 m.) 2. Subtropical forest (1,500 m. to 2,000 m.) 3. Temperate forest (2,000 m. to 3,800 m.).

Conservation of wildlife is compatible with the Buddhist philosophy of the inhabitants. This is fortunate because Bhutan is endowed with magnificent assets in its rich and varied fauna, which exists in a natural state of equilibrium with its environment. Some of the common game animals and birds include: Tiger *(Panthera tigris),* Himalayan black bear *(Selenarctos thibetanus),* Musk deer *(Moschus moschiferus),* Great one-horned rhinoceros *(Rhinoceros unicornis),* Manchurian crane, Black pheasant and Tragopan. Wildlife conservation and management is an integral part of the forestry program and is directed by the Royal Forest Department.

To preserve wildlife in general and the species threatened with extinction in particular (e.g. Snow leopard, Golden langur, Rhinoceros, Takin and Tiger), The Royal Government of Bhutan has designated the following Sanctuaries, National Parks and Game Reserves: Laya Wildlife Sanctuary (which contains Snow leopard and Blue sheep); Gasa Wildlife Sanctuary (Bear and Musk deer); Jigme Dorji Wildlife Sanctuary (Musk deer and Takin); Goley Game Reserve (Ghoral, Elephant, Gaur); Doga National Park (Ghoral, Thar); and the Mochu Reserved Forest, Pochu Reserved Forest, Khaling Reserved Forest, and Manas Wildlife Sanctuary which all harbour Elephant, Tiger, Gaur, Sambar and Wild boar. These Sanctuaries, National Parks and Reserves encompass an area of approximately 9,260 km^2, or 20% of the total land area.

Assistance needed from World Wildlife Fund

To conserve and manage the wildlife in this Himalayan kingdom the following requests were made to the World Wildlife Fund: 1. To allocate funds to compensate for the loss of domestic animals killed by tigers. As the killing of tigers is completely banned, the Royal Government must compensate villagers for their losses. 2. To supply equipment such as radios, boats, vehicles, and to allot for the purchase of elephants to facilitate patrolling of Sanctuaries and National Parks. 3. To train personnel in wildlife management.

In the Spring of 1976, Mr. Peter Jackson of World Wildlife Fund, was invited by the Royal Government to examine and evaluate the justification of the above requests. Assistance from the World Wildlife Fund will help Bhutan to a great extent while Bhutan will be able to contribute substantially towards World Wildlife Fund goals.

Mr. C. Dorji is Director of Forests, Royal Government of Bhutan, Dechenche Taba, P.O. Thimphu.

NEW HOPE FOR PAKISTAN'S PHEASANTS

A year ago the concept of buffer breeding programmes for certain endangered pheasant species had barely been considered, but in 1976 we were able to visit four new captive breeding centres in Pakistan, and others were being set up. Initially they are being stocked by eggs which are flown out weekly during the main part of the breeding season from England by the World Pheasant Association. The cost of transporting the eggs being generously absorbed by Pakistan International Airlines.

The priority species in 1976 is the Cheer pheasant *(Catreus wallichi),* one of sixteen species of pheasant currently listed in the I.U.C.N. **Red Data Book,** and most probably already extinct in Pakistan except perhaps in a part of Azad Kashmir. Eggs have also been despatched of Himalayan monal *(Lophophorus impeyanus)* and White crested kalij *(Lophura leucomelana hamiltoni).* In 1977 the World Pheasant Association intends to concentrate on Monal and Koklass so far as supplies of eggs from the United Kingdom are concerned.

While the new breeding centres have been getting under way in the Murree Hills in the Northern Punjab and the Kaghan Valley in the Northwest Frontier Province, the D.F.O. Wildlife for Azad Kashmir, Sherk Abdul Qayoom has been in England studying pheasant breeding and management in a 2 1/2 month course organised by the World Pheasant Association. Azad Kashmir is the home of one of the world's rarest pheasants, the Western tragopan *(Tragopan melanocephalus),* and as first steps towards ensuring its survival a large area in which it is known to still exist is being declared as a National Park.

There may be a long way to go to make good the ravages of the past, but when one can hear the Koklass pheasant *(Pucrasia macrolopha)* calling from Shogran Resthouse in the Kaghan, as I did in 1976, one can be certain that improvements are taking place.

A second trainee has also been in England, sent by the Punjab Livestock Board, to study the possibilities and economics of setting up game farms for quails and pheasants on a major commercial scale. Already small scale trials are being conducted in the Punjab.

There are two even more significant developments - the first has been the setting up of new reserves for pheasants in the Bichla and Bunja Valleys, and the Kunjereb National Park in Hunza in the Frontier Province, and four new reserves in Azad Kashmir. These are welcome additions to the already comprehensive system of parks and reserves that were already established in Pakistan. These actions will help to arrest the decline of wildlife in those areas where destruction of habitat in its many forms has been the main cause of population instability.

The second is an even more significant development as it concerns the whole approach towards preserving the habitats and conservation in general. I refer to the positive conservation policies towards the Galliformes which is being adopted in all Provinces. Wildlife Departments no longer have to justify employment by the amount of the fines for poaching imposed by the courts. Other considerations are now being taken into account, in particular that game management can result in a croppable surplus for which licence fees can be charged. It is an established fact that tourists will not come to see barren hillsides, or attempt to fish in rivers clouded with soil from erosion from such hillsides.

In short, most policy makers in Pakistan realize that sound conservation practices are not only sensible, but also offer a means for long-term economic gain.

The next few years will undoubtedly see even greater changes. The World Pheasant Association hopes to have the privilege of playing a small part in this. Indeed, a branch of the World Pheasant Association with it's own internal fund-raising projects working in close association with W.W.F.-Pakistan is already under way.

These are still the early days, and if wildlife departments and conservationists in other countries in Asia from which many pheasant species come notably India, Nepal, and China co-operate as enthusiastic as Pakistan in an international programme to save the pheasants of Asia, there surely will be new hope for the survival and spread of these birds in the region.

Keith Howman
Secretary, Conservation Projects
World Pheasant Association
Ashmere, Felix Lane
Shepperton, Middlesex
U.K.

Himalayan monal pheasant (Howman)

NOTES

CONSERVATION EDUCATION PROGRAMME - INDONESIA

The Conservation Education Programme is a joint project between WWF International and the Indonesian Government, Direktorat PPA, the Indonesian Nature Conservation and Wildlife Department. Regina Frey, a WWF advisor, is directing the programme.

The objective of the Conservation Education Programme is to develop awareness among the people of Indonesia about their personal advantage by making proper use of and taking care of natural resources. The C.E. Programme should arouse a sense of responsibility and develop some insight into the problems of nature conservation.

The main tasks of the C.E. Programme in Indonesia will be (a) training of local personnel (b) to provide educational material (c) to set up the basic facilities for the conservation education programme and (d) to perform conservation education applying different approaches.

Formal and non-formal conservation education in vocational schools, government and public schools, for the public in towns and villages, especially on the occasion of fairs or festival days, mainly with audio-visual presentations, will play an important role in the Programme. Talks in clubs, organising exhibitions and competitions, making use of radio, television, newspapers, magazines, will also be undertaken in addition to organising camps and excursions for schools, scouts and youth clubs, establishing visitor's centres and developing wildlife tourism.

The ideas of economizing and preserving natural resources are still not widely accepted. Preservation laws are all too often either unknown or ignored because of lack of understanding. The preservation of natural resources requires the total reverse of many practices which have been applied during past generations. The most effective way of achieving this change is by approaching and involving the younger generations, as this programme proposes.

The experience with WWF Conservation Education Programme in North Sumatra in 1976 has shown that there is a lot of interest and concern for wildlife and conservation among the local population. The people are very receptive to audio-visual presentations.

The Conservation Education Programme was started in February 1977. An audio-visual unit began in April with a programme in Aceh Province, concentrating on areas neighbouring the Gunung Leuser Reserve.

Work plans for the Public Relation and Mass Media activities are being prepared and a proposal for an Indonesian Wildlife Journal has been worked out.

Three campaigns (for Journlists' Association, Teachers' Association and Scouts/Youth Clubs) are planned to introduce the Conservation Education Programme on a broad scale.

The Conservation Education Programme is financed by WWF International and the Indonesian Government (Direktorat PPA), supported by the Indonesian Wildlife Foundation and the Dutch Government.

Miss Frey requests information in the field of wildlife and environmental conservation from abroad, especially from Southeast Asian countries, as the conditions there allow a certain comparison with the situation in Indonesia. She is grateful for any information from National WWF appeals, Nature Conservation Associations etc., in the form of their newsletters, booklets, reports and press releases.

Her address is: Conservation Education Programme
d/a Direktorat PPA
Jl. Ir. H. Juanda 9
Bogor, Indonesia

SALTLICKS

Currently three U.S. Peace Corps Volunteers in Thailand - John Erickson at Phu Khieo Wildlife Sanctuary in Chaiyaphum, Doyle Damman at Kao Soi Daow Wildlife Sanctuary in Chantaburi, and Gary Wiles at Salak Phra Wildlife Sanctuary in Kanchanaburi - are working under the Wildlife Conservation Division of the Royal Forest Department. One subject they are jointly pursuing is the relationship of wildlife to naturally occurring saltlicks. They are interested in finding enough information about frequency of use, seasonal use patterns, necessity as an element in home range, and mineral composition, to make management proposals for maintenance of natural saltlicks and development of artificial sites. One of the problems is finding pertinent literature. If any of the TIGERPAPER readers could direct them to literature or other people

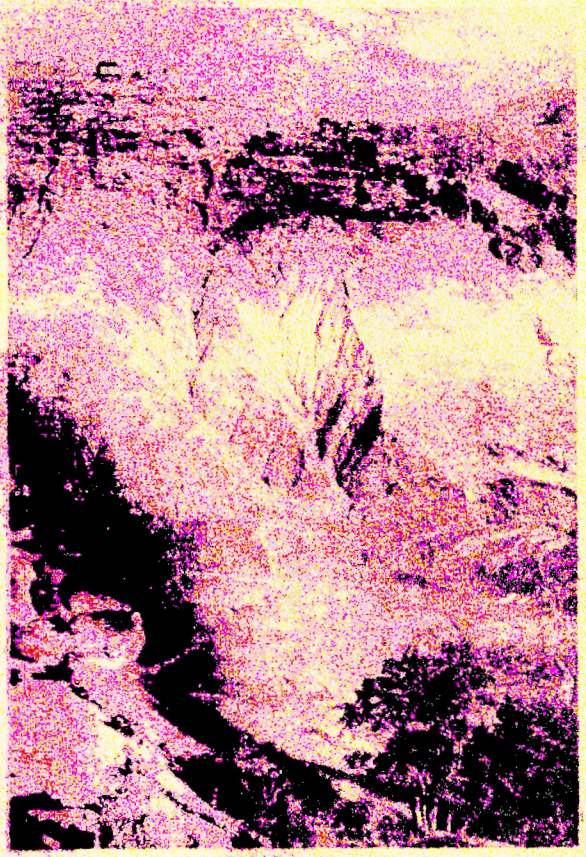
interested in saltlicks it would be most appreciated.

Contact Gary Wiles, Salak Phra Wildlife Sanctuary, c/o Provincial Forestry Office, Amphur Muang, Kanchanaburi, Thailand.

JAVAN RHINO CENSUS

The 1975 annual rhino census in the Udjung Kulon reserve in western Java produced an estimate of 45-54, continuing the slow but steady increase recently recorded. Five rhinos were encountered during the census, the highest number on record, and helping to confirm the increase.

from Oryx, *February 1977*



DESTRUCTION IN THE HIMALAYA

In Nepal more than 77,000 ha of forested land was officially designated for settlement in the Terai, but more than three times that area is thought to have been illegally cleared. Soil erosion has not surprisingly greatly accelerated, and in the eastern hills about 38 per cent of the land consists of abandoned farmland, ruined by erosion and inefficient farming.

from Oryx, *February 1977*

DDT DOWN-OSPREY UP

According to the National Audubon Society's Audubon Leader for November "ospreys along the Northeast Atlantic Coast show heartening evidence that DDT has been gradually washing out of the environment since it has been generally banned in the U.S. These big birds, fish eaters at the top of the food chain, are particularly vulnerable to the long-lasting pesticides, and their numbers have dropped about 90 percent in the past 25 years. But field studies this year show that the remaining pairs are now producing young ones at a success rate not seen in that region since the 1940's."

from International Association of Fish and Wildlife Agencies Newsletter *December 1976*

NEW ZEALAND BANS WHALE PRODUCTS

New Zealand has banned importation of whale products, making it the second nation to announce a total embargo. The other is the United States. Partial bans operate in Australia, France and the U.K.

from Oryx, *February 1977*

TRADE IN WILDLIFE

TRAFFIC (Trade Records Analysis of Flora and Fauna in Commerce) is a Specialist Group of the Survival Service Commission of the International Union for the Conservation of Nature and Natural Resources. Its function is to monitor the international trade in wildlife on behalf of the Survival Service Commission. To carry this out the group needs the cooperation of whoever has knowledge of animal trade - both legal and illegal - throughout the world. Any information concerning numbers of animals captured, confiscated, exported, or imported in any country will be appreciated. Compilation of data on the international trade of animals may motivate many countries to tighten up on their conservation laws. Send all information you have to:

Mr. John A. Burton
Fauna Preservation Society
c/o Zoological Society of London
Regent's Park
London NW1 4RY
United Kingdom

Leadbeater's possum *(Gymnobelideus leadbeateri)*.